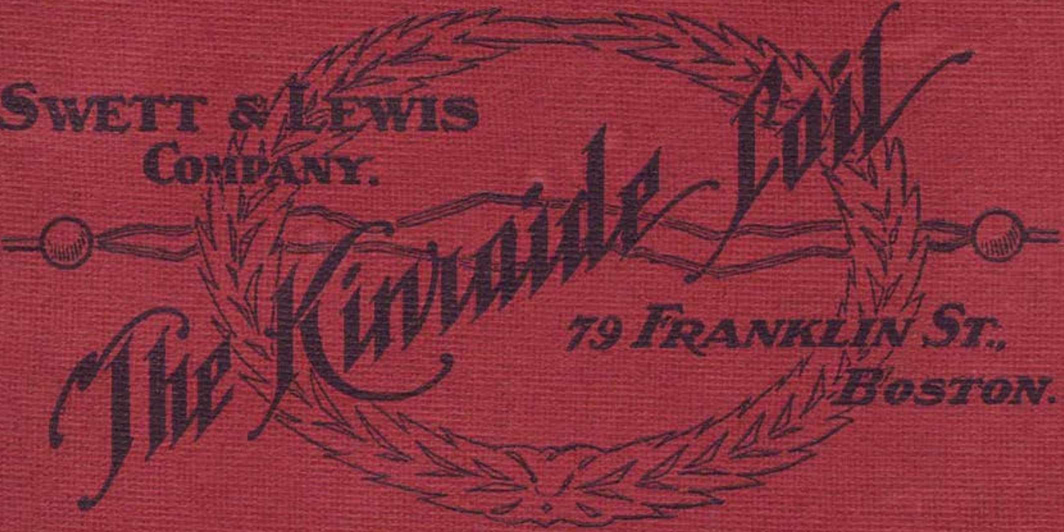
JEFF BEHARY

IN QUEST OF KINRAIDE

VOLUME TWO: References, Restorations, Reproductions, and Photo Galleries

Fig. 6
B3
C2
B2
C5
C3
Filiform Discharge
Inventor.
Thomas B. Kinraide
The Kinraide Coil

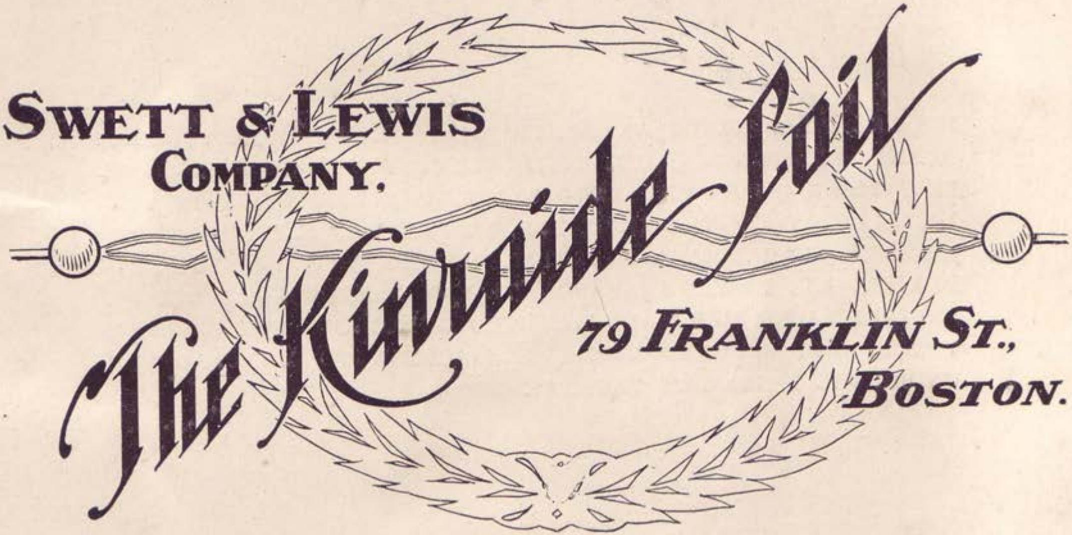
Private



SWETT & LEWIS COMPANY.

The Kinraide Coil

79 FRANKLIN ST.,
BOSTON.



SWETT & LEWIS COMPANY.

The Kinraide Coil

79 FRANKLIN ST.,
BOSTON.

WE ARE PLEASED TO ANNOUNCE THAT WE ARE SOLE SELLING AGENTS FOR THE KINRAIDE COILS, WHICH HAVE NOT UNTIL NOW BEEN MADE ON AN EXTENDED SCALE, THE FEW BUILT IN THE LABORATORY OF THE INVENTOR, MR. THOMAS B. KINRAIDE OF JAMAICA PLAIN, MASSACHUSETTS, HAVING WON UNSTINTED PRAISE. MR. HOWARD JACKSON, THE WELL-KNOWN ELECTRICAL ENGINEER WHO HAS MANUFACTURED OUR GOODS FOR SEVERAL YEARS, HAS SECURED THE SOLE LICENSE TO MANUFACTURE UNDER MR. KINRAIDE'S PATENTS.

The Kinraide Induction Coil

WINDING

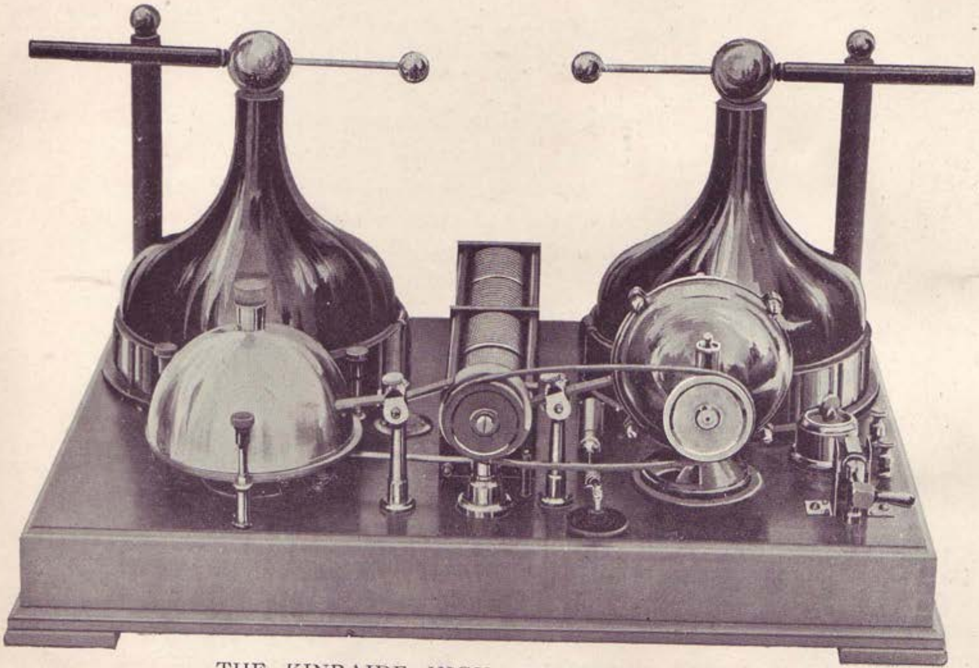
THE Rhumkorff Coil, with its many miles of fine wire wound in thin sections, a hundred or more of which are necessary for a twelve-inch spark coil, is the starting point from which the Kinraide Induction Coil was developed. This coil consists of two separate secondaries with their primaries connected in series. Each secondary has a high and low potential terminal due to the position and the method of winding the primary. The primary is located *outside* the secondary winding. The secondaries are wound in single flat discs and lie in the same plane as the primaries; with this method of construction the discharge from the two terminals is vastly different.

The potential at the central terminal of the secondary is extremely high, whilst that of the outer turns near the primary is very low. By connecting the outer terminals of two such secondaries in series the potential of the outer turns entirely disappears.

A UNIQUE FEATURE

This unique feature is of the utmost importance, as there is no tendency to discharge into the primary, a most deplorable weakness of the Rhumkorff Coil, and most expensive, since, if the primary tube is punctured, the coil is practically ruined. The secondary of the Kinraide Coil is not subject to any such danger.

Another weak feature of the Rhumkorff Coil is the heat developed in the primary. Outside the wall of the primary tube, and in contact with it, is the



THE KINRAIDE HIGH FREQUENCY COIL

insulating compound. The least increase of temperature in the primary softens this and before danger is suspected, it has melted, and no safe operation can thereafter be assured.

ABSENCE OF HEAT

There is absolutely no heating in the primary of the Kinraide Coil, so that the insulation cannot be melted, nor is there heat generated where it can in any way affect this delicate part of the apparatus.

In the above, the Rhumkorff Coil is used for comparison only, and not to depreciate its value, after long years of service as an inseparable part of a well-equipped laboratory.

SPARK GAP

HIGH FREQUENCY

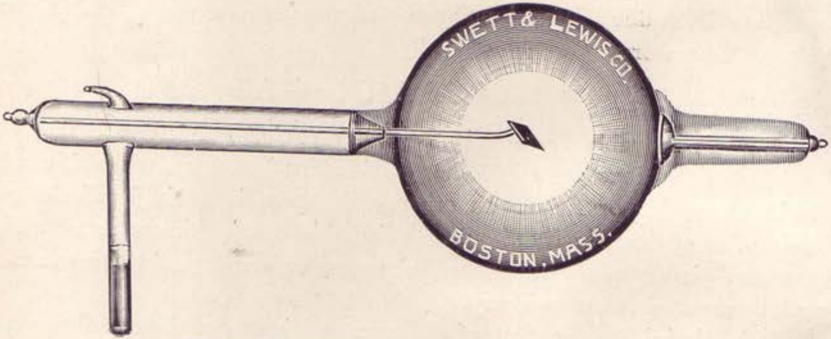
A most valuable feature is the water cooled spark gap. The heat ordinarily developed in various parts of other coils is localized here, where it can be taken care of without trouble or risk. In other coils there is a single discharge from every interruption of the primary circuit. With this spark gap we have a high frequency apparatus giving many hundred discharges, or surgings, in the secondary for every break or reversal in the primary.

DISCHARGE

This diminishes the time of exposure and increases the steadiness of the illumination of the screen. The appearance of the discharge is wholly different from the Rhumkorff spark, and must be seen to be appreciated.

IMPROVED INTERRUPTER

A vexatious feature of the old apparatus was the constant attention required by the vibrator. The sticking of the platinum points and the cost of their renewal is


SWETT & LEWIS CO.
BOSTON, MASS.

TYPE K FOR DIRECT CURRENT USE

entirely eliminated by the new rotary break, which will easily handle sufficient current without noticeable sparking.

DURABILITY

This interrupter is a most solid and durable thing, and with the spark gap embodies an entirely new principle. It is as durable as any part of the coil, and when started runs at constant speed until the motor is stopped. The alternating coil requires no interrupter. The spark gap, however, is essential.

PORTABILITY

LIGHT WEIGHT

The use of so little wire in the coil makes the apparatus compact, strong and readily portable. The whole outfit may be taken in the physician's buggy. In hospitals it may be placed upon a small table and moved from ward to ward. The weight of the coil complete is from sixty-five pounds to seventy-five pounds.

SMALL AMOUNT OF CURRENT USED

This apparatus consumes three to four amperes. It can be attached to any lamp socket, and is also constructed for use with storage batteries.

SHORT EXPOSURES

SUCCESSFUL TESTS

For X-ray fluoroscopic work great steadiness of illumination is necessary; also energy enough to brilliantly illuminate the screen. For radiographs it is essential that the time of exposure be not very long; in fact a great amount of detail in the finished negative is often sacrificed on account of difficulties attending a prolonged exposure. All these valuable effects are obtainable in this new apparatus, which has been put to most severe tests in both private and hospital work for the past two years, and is highly recommended by the users.

The following table of exposures will be found to meet the requirements in the average case, with a normal distance and a plate of the ordinary speed.

FOR ADULTS

Chest	3 minutes	Pelvis	5 minutes
Shoulder	3 minutes	Hip	5 minutes
Elbow	15 seconds	Knee	60 seconds
Wrist	5 seconds	Ankle	15 seconds
Hand	3 seconds	Foot	5 seconds

SUMMARY OF ADVANTAGES

RELIABILITY

A summary of the advantages of the Kinraide Coil are portability, safety of operation, simplicity of construction, durability, small amount of current used in operating, steadiness of illumination of fluorescent screen, a greater amount of X-ray light than from any other apparatus using anything like the same amount of current, always ready for work in all weathers, no sparking into the primary, no melting of the solid insulation of the secondary, easily and cheaply repaired, no platinum points, no breaking down of the condenser, and a much shorter time of exposure than has been before obtained.

TUBES

Our tube at first sight is not different from the ordinary X-ray tube. It is, however, carefully constructed upon accurate measurements made from, and according to the requirements of this coil. The curvature and size of the cathode, its distance from the anode, and the proper vacuum have all been experimentally determined and incorporated into its structure. The alternating current tube is a new departure, and is the outcome of years of experiment, and is unequalled for definition.

VACUUM ADJUSTER

Too much stress cannot be laid upon the necessity of having a suitable tube, as therein lies the secret of the best work. All of our tubes for coil use are fitted with our special vacuum adjuster, by which the vacuum can be held at any point with ease. It has been a difficult problem to successfully design a tube to resist the energy developed by the Kinraide Coil, many methods having been tried with varying success.

HEATING CONTROLLED

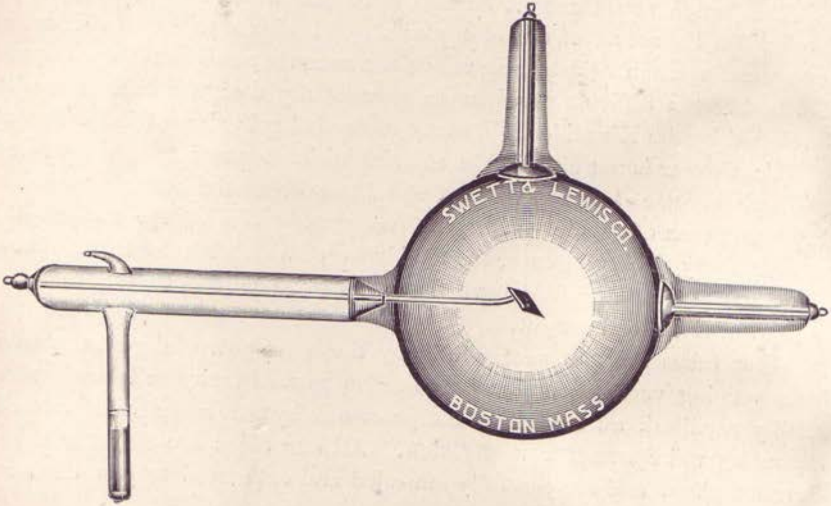
Cold water is not a desirable element to introduce into a tube while in operation; neither is the use of masses of base metal to take up the heat advisable, on account of the gases given off, which change the vacuum. We believe the proper method is to use extremely thick platinum, the avoidance of which has heretofore been the object of many manufacturers. We have found that this is the surest, and best method to acccomplish the end sought.

ECONOMY

Our tubes are run successfully by the most powerful generators with no trouble from varying vacuum, and experience has proved their use is economical. They are readily repaired, an advantage not possessed by the complicated varieties, and by no means an unimportant consideration. All our tubes are *hand made* from the best German glass, and are carefully annealed and exhausted to just that nice point which gives the best results.

TERMINALS

Our terminals are worthy of commendation. We are proud of the mechanical design of our tubes, and extended use shows that they have ample strength exactly where needed. In short, our aim has been to avoid complication of all kinds, and the accompanying cuts show how well we have succeeded.


SWETT & LEWIS CO.
BOSTON MASS

TYPE H FOR ALTERNATING CURRENT USE

TUBE STANDS

SIMPLE Our experience has shown us that the present tube-holders on the market leave much to be desired for practical every-day work. After much experimenting we have produced a floor stand that is not complicated, has all needful adjustments, is sufficiently rigid, and looks well.

ADJUSTABLE An adjustable spark gap for tube regulations is a valuable feature, and this addition takes up no extra space. The only metal used is the cast iron base. The tubes and wires are well insulated with the best hard rubber, thus increasing the efficiency of the whole apparatus.

PRICE LIST

COILS

This apparatus is constructed from the finest materials and finished in the best possible manner. No second grade is made.

The Kinraide Induction Coil . . . Net.	$200.00
(Direct and alternating currents of all voltages from 20 to 500)	

TUBES

K Tube for Direct Current Coil	15.00
H Tube for Alternating Current Coil only . .	18.00

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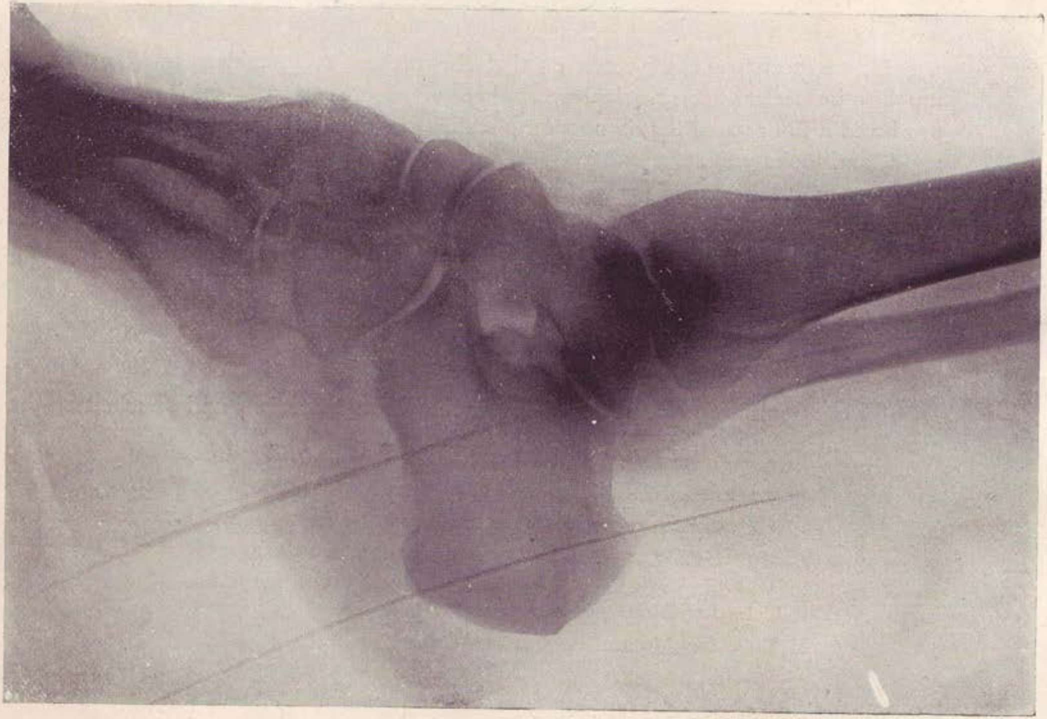
aa

An allowance of $3.00 will be made for the return of the complete terminals of either of the above tubes towards the price of new apparatus.



FIFTEEN SECONDS EXPOSURE

FLUOROSCOPES

Platinum Barium Cyanide Fluoroscope, 4 x 5	8.00
Platinum Barium Cyanide Fluoroscope, 5 x 5	10.00
Platinum Barium Cyanide Fluoroscope, 5 x 7	12.50
Platinum Barium Cyanide Fluoroscope, 6 x 6	13.00
Platinum Barium Cyanide Fluoroscope, 6 x 8	16.00
Platinum Barium Cyanide Fluoroscope, 8 x 10	24.00

40%

QUALITY

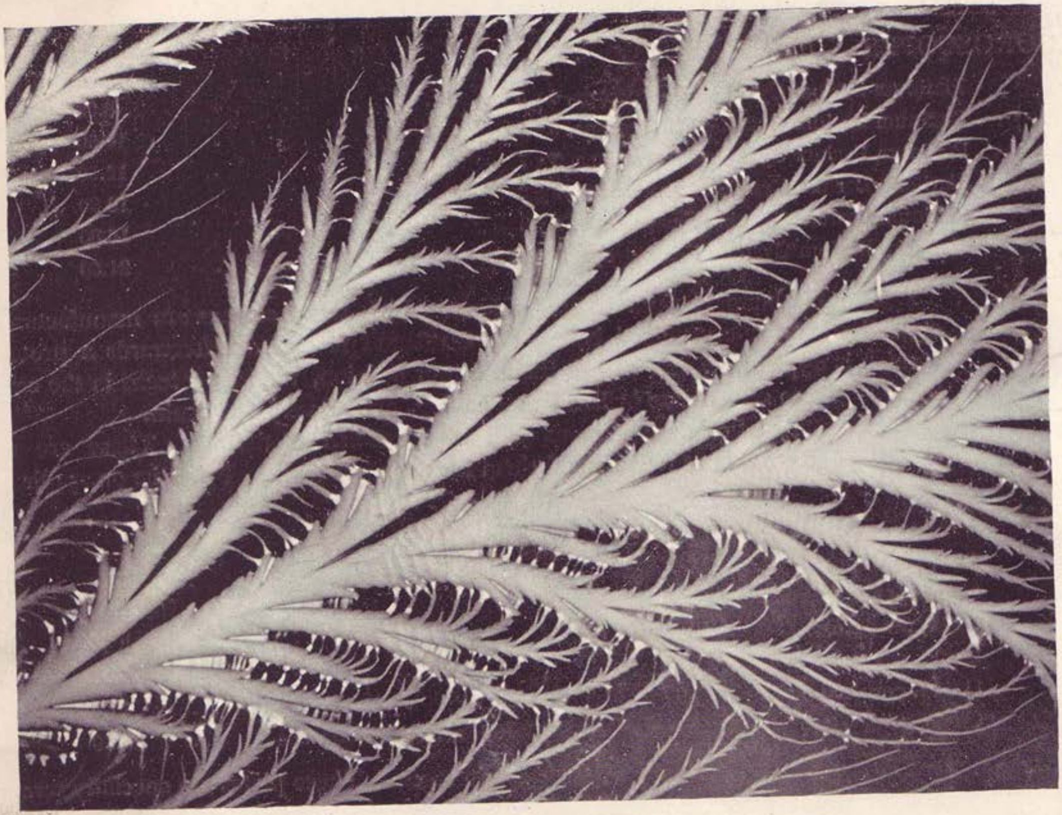
The Platinum Barium Cyanide, from which these screens are manufactured, is crystalized and re-crystalized before the cardboard is coated; afterwards a protecting varnish is applied, which makes them, in our opinion, the best screens in the country today. These screens are brilliant and lasting, and of very fine grain.

Tungstate of calcium screens will be furnished if desired. These are much cheaper, but we do not recommend them for ordinary work. Price list on application.

X-RAY PLATES

5 x 7, per dozen	$1.40
6½ x 8½, per dozen	2.30
8 x 10, per dozen	3.40
10 x 12, per dozen	5.50
11 x 14, per dozen	7.00
Complete developing and printing outfit, with full instructions for use	5.00

A supply of the above sizes always in stock. These plates are specially wrapped in light proof paper, no plate holder being required for use with the X-ray.



POSITIVE DISCHARGE FROM KINRAIDE COIL (Reduced)

FLOOR TUBE STAND

Floor Tube-Stand, with Adjustable Spark Gap	$10.00
A finely polished quartered oak table large enough for either of the foregoing outfits, and equipped with ball-bearing castors	12.00

40%

SAMPLE OUTFITS

OUTFIT NUMBER TWENTY-ONE.

FOR DIRECT CURRENT—

One (1) Direct Current Kinraide Coil	$200.00
Two (2) Tubes, Type K	30.00
One (1) 5 x 7 Platinum Barium Cyanide Fluoroscope	12.50
One (1) Floor Tube-Stand, with adjustable Spark Gap for controlling vacuum	10.00
Total	$252.50

OUTFIT NUMBER TWENTY-TWO

FOR ALTERNATING CURRENT—

One (1) Alternating Current Kinraide Coil	$200.00
Two (2) Tubes, Type H	36.00
One (1) 5 x 7 Platinum Barium Cyanide Fluoroscope	12.50
One (1) Floor Tube-Stand, with adjustable Spark Gap for controlling vacuum	10.00
Total	$258.50

In ordering coils give voltage of circuit, whether direct or alternating; if alternating, the number of alternations.

Full directions for operating accompany each coil.

We want our customers to feel perfectly free at all times to call upon us for expert advice on all things pertaining to the operation of X-ray outfits.

The factory where our goods are manufactured is well equipped with the finest tools and latest facilities for our business.

CATALOGUES

If interested in static machines and electro-therapeutical apparatus in general send for Bulletin Number Twenty-Four. Static tubes, Bulletin Number Twenty-Five.

TERMS

Prices in this catalogue are net.

Remit by money order, express or by New York draft. Add twenty-five cents to face of all checks except on New York or Boston, to cover collection charges.

REFERENCES

Customers unknown to us must give satisfactory references, or send cash with order, for which we will allow five per cent. We will ship C. O. D., provided a remittance of twenty per cent. accompanies order. Charges for return of money to be borne by purchaser.

Goods will be delivered f. o. b., freight or express, Boston, Mass. No charges for packing. Each piece of apparatus is carefully packed and no allowance will be made for loss or breakage in transit.

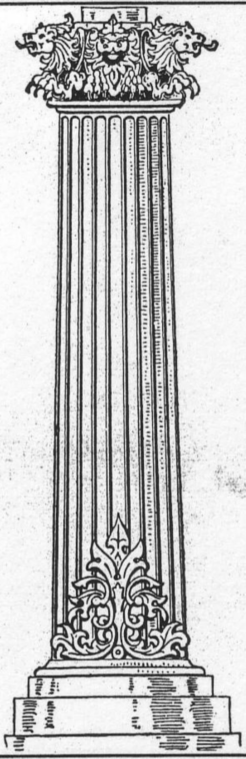
PRESS OF MURRAY AND EMERY COMPANY
BOSTON

SWETT AND LEWIS
COMPANY

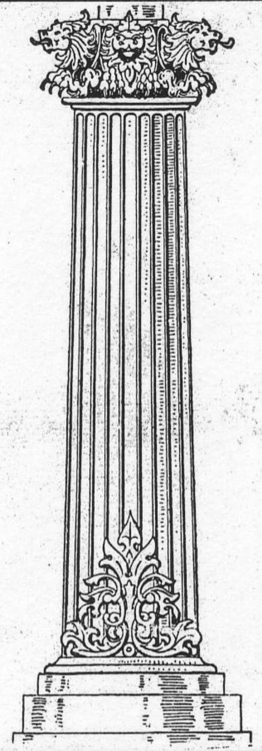
THE KINRAIDE COIL

18 BOYLSTON STREET
BOSTON

SWETT AND LEWIS COMPANY



BULLETIN
NUMBER
TWENTY-EIGHT



NUMBER EIGHTEEN BOYLSTON STREET
BOSTON MASSACHUSETTS, U. S. A.

WE ARE PLEASED TO ANNOUNCE THAT WE ARE SOLE SELLING AGENTS FOR THE KINRAIDE COILS, WHICH, PREVIOUS TO JUNE, 1901, WERE NOT MADE ON AN EXTENDED SCALE, THE FEW BUILT IN THE LABORATORY OF THE INVENTOR, MR. THOMAS B. KINRAIDE, OF JAMAICA PLAIN, MASSACHUSETTS, HAVING WON UNSTINTED PRAISE. MR. HOWARD JACKSON, THE WELL-KNOWN ELECTRICAL ENGINEER, WHO HAS MANUFACTURED OUR GOODS FOR SEVERAL YEARS, HAS SECURED THE SOLE LICENSE TO MANUFACTURE UNDER MR. KINRAIDE'S PATENTS

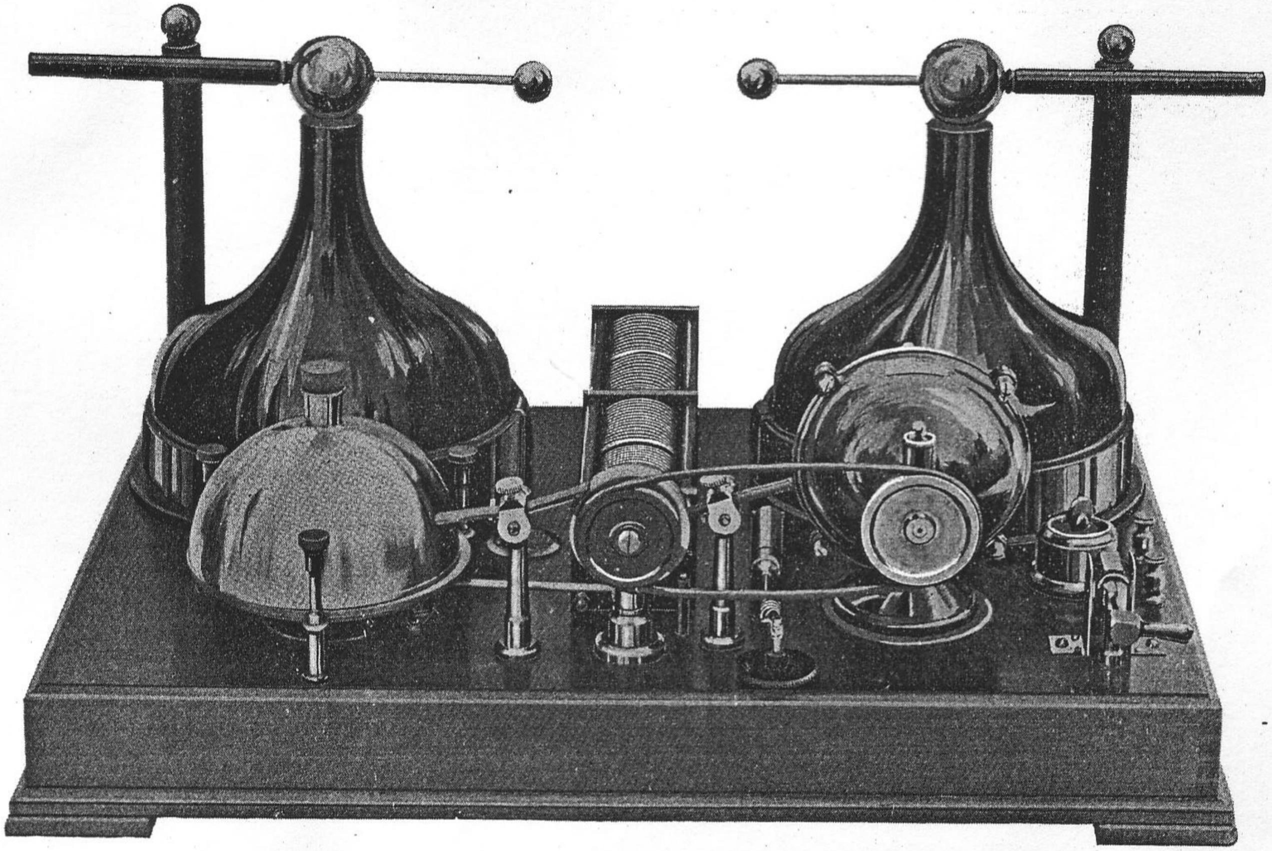
THE KINRAIDE INDUCTION COIL

THE Rhumkorff Coil, with its many miles of fine wire wound in thin sections, a hundred or more of which are necessary for a twelve-inch spark coil, is the starting point from which the Kinraide Induction Coil was developed. This coil consists of two separate secondaries with their primaries connected in series. Each secondary has a high and low potential terminal due to the position and the method of winding the primary. The primary is located *outside* the secondary winding. The secondaries are wound in single flat discs and lie in the same plane as the primaries; with this method of construction the discharge from the two terminals is vastly different. The potential at the central terminal of the secondary is extremely high, while that of the outer turns near the primary is very low. By connecting the outer terminals of two such secondaries in series the potential of the outer turns entirely disappears.

A UNIQUE FEATURE

This unique feature is of the utmost importance, as there is no tendency to discharge into the primary, a most deplorable weakness of the Rhumkorff Coil, and most expensive, since, if the primary tube is punctured, the coil is practically ruined. The secondary of the Kinraide Coil is not subject to any such danger.

Another weak feature of the Rhumkorff Coil is the heat developed in the primary. Outside the wall of the primary tube, and in contact with it, is the insulating compound. The least increase of temperature in the primary softens this, and before danger is suspected, it has melted, and no safe operation can thereafter be assured.



THE KINRAIDE HIGH FREQUENCY COIL, DIRECT CURRENT

ABSENCE OF HEAT

There is absolutely no heating in the primary of the Kinraide Coil, so that the insulation cannot be melted, nor is there heat generated where it can in any way affect this delicate part of the apparatus.

In the above, the Rhumkorff Coil is used for comparison only, and not to depreciate its value, after long years of service as an inseparable part of a well-equipped laboratory.

SPARK GAP

HIGH FREQUENCY

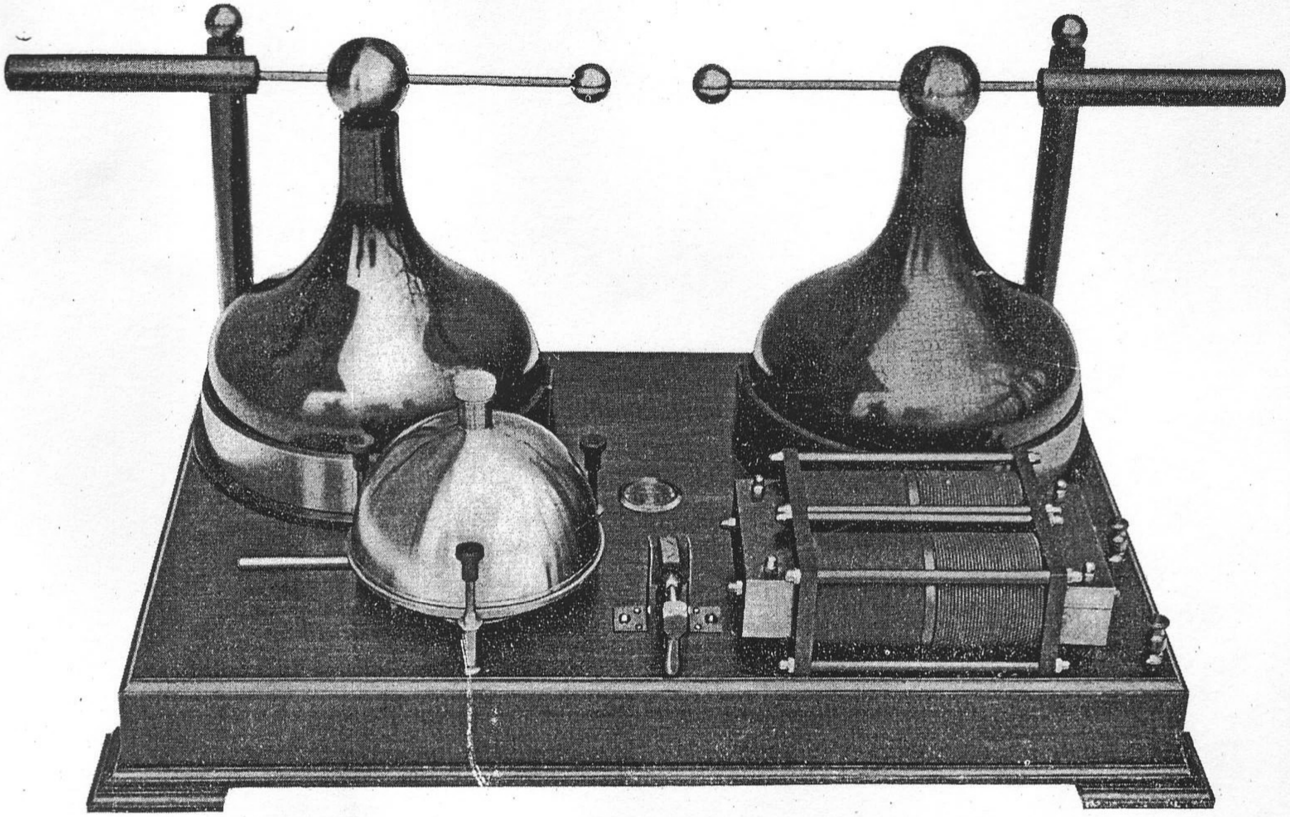
A most valuable feature is the water cooled spark gap. The heat ordinarily developed in various parts of other coils is localized here, where it can be taken care of without trouble or risk. In other coils there is a single discharge from every interruption of the primary circuit. With this spark gap we have a high frequency apparatus giving many hundred discharges, or surgings, in the secondary for every break or reversal in the primary.

DISCHARGE

This diminishes the time of exposure and increases the steadiness of the illumination of the screen. The appearance of the discharge is wholly different from the Rhumkorff spark, and must be seen to be appreciated.

IMPROVED INTERRUPTER

A vexatious feature of the old apparatus was the constant attention required by the vibrator. The sticking of the platinum points and the cost of their renewal



THE KINRAIDE HIGH FREQUENCY COIL, ALTERNATING CURRENT is entirely eliminated by the new rotary break, which will easily handle sufficient current without noticeable sparking.

DURABILITY

This interrupter is a most solid and durable thing, and with the spark gap, embodies an entirely new principle. It is as durable as any part of the coil, and when started runs at constant speed until the motor is stopped. The alternating coil requires no interrupter. The spark gap, however, is essential.

PORTABILITY

LIGHT WEIGHT

The use of so little wire in the coil makes the apparatus compact, strong and readily portable. The whole outfit may be taken in the physician's buggy. In hospitals it may be placed upon a small table, and moved from ward to ward. The weight of the coil complete is from sixty-five to seventy-five pounds.

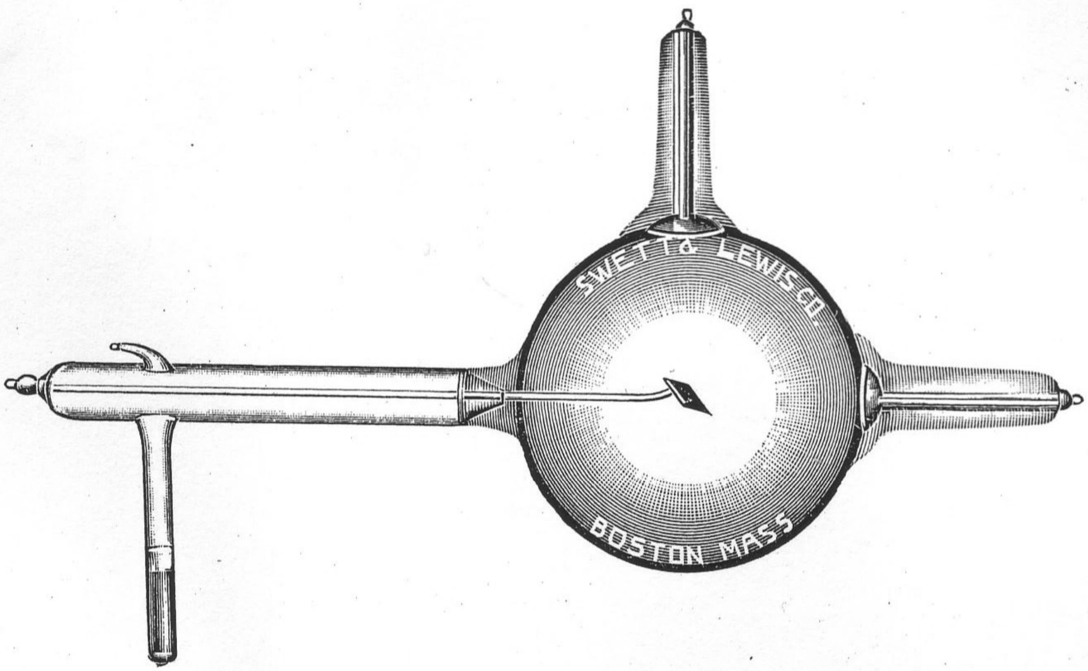
SMALL AMOUNT OF CURRENT USED

This apparatus consumes about two hundred watts, costing from two to four cents per hour at the average price of electricity. It may be attached to any incandescent lamp socket, either direct or alternating current.

SHORT EXPOSURES

SUCCESSFUL TESTS

For X-ray fluoroscopic work great steadiness of illumination is necessary; also energy enough to brilliantly illuminate the screen. For radiographs it is essential


SWETT & LEWIS CO.
BOSTON MASS

TYPE H FOR ALTERNATING CURRENT USE

EXPOSURE

that the time of exposure should not be long; in fact, a great amount of detail in the finished negative is often sacrificed on account of difficulties attending a prolonged exposure. All these valuable effects are obtainable in this new apparatus, which has been put to most severe tests in both private and hospital work for the past three years, and is highly recommended by the users.

The following table of exposures will be found to meet the requirements in the average case, with a normal distance and a plate of the ordinary speed.

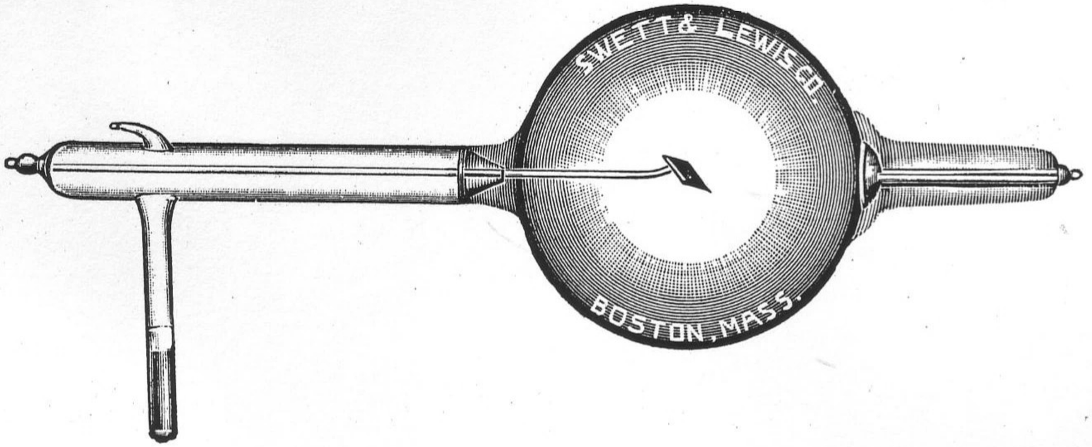
FOR ADULTS

Chest	2 minutes	Pelvis	2½ minutes
Shoulder	2 minutes	Hip	2½ minutes
Elbow	15 seconds	Knee	60 seconds
Wrist	5 seconds	Ankle	15 seconds
Hand	3 seconds	Foot	5 seconds

SUMMARY OF ADVANTAGES

RELIABILITY

A summary of the advantages of the Kinraide Coil are portability, safety of operation, simplicity of construction, durability, small amount of current used in operating, steadiness of illumination of fluorescent screen, a greater amount of X-ray light than from any other apparatus, always ready for work in all weathers, no sparking into the primary, no melting of the solid insulation of the secondary, easily and cheaply repaired, no platinum points, no breaking down of the condenser, a much shorter time of exposure than has been before obtained, and it cannot be burned out.


SWETT & LEWIS CO.
BOSTON, MASS.

TYPE K FOR DIRECT CURRENT USE

REGULATION AND CONTROL

The Kinraide Coil and the tubes designed for it are built to stand the full current from the street mains. Experience, however, has shown that a regulating device is required for the best work.

SPECIAL RHEOSTAT

For this purpose a special rheostat is inserted in the primary circuit, and this, together with the vacuum regulating device attached to the tube and stand, enables the operator to regulate the coil and tube to a nicety.

In the field of therapeutics a rheostat is an absolute necessity, as the full current from the coil can be borne by but few patients. By its use the dosage may be regulated from one so light as to be almost imperceptible, to one so strong as to produce the most severe effects.

TUBES

Our tube, at first sight, is not different from the ordinary X-ray tube. It is, however, carefully constructed upon accurate measurements made from, and according to the requirements of this coil. The curvature and size of the cathode, its distance from the anode, and the proper vacuum have all been experimentally determined and incorporated into its structure. The alternating current tube is a new departure, is the outcome of years of experimentation, and is unequalled for definition. For best results our tubes should always be used with these coils.

VACUUM ADJUSTER

Too much stress cannot be laid upon the necessity of having a suitable tube, as therein lies the secret of the best work. All of our tubes for coil use are fitted with our special vacuum adjuster, by which the vacuum can be held at any point with ease. It has been a difficult problem to successfully design a tube to resist the energy developed by the Kinraide Coil, many methods having been tried with varying success.

HEATING CONTROLLED

Cold water is not a desirable element to introduce into a tube while in operation; neither is the use of masses of base metal to take up the heat advisable, on account of the gases given off, which change the vacuum. We believe the proper method is to use extremely thick platinum, the avoidance of which has heretofore been the object of many manufacturers. We have found that this is the surest and best method to accomplish the end sought.

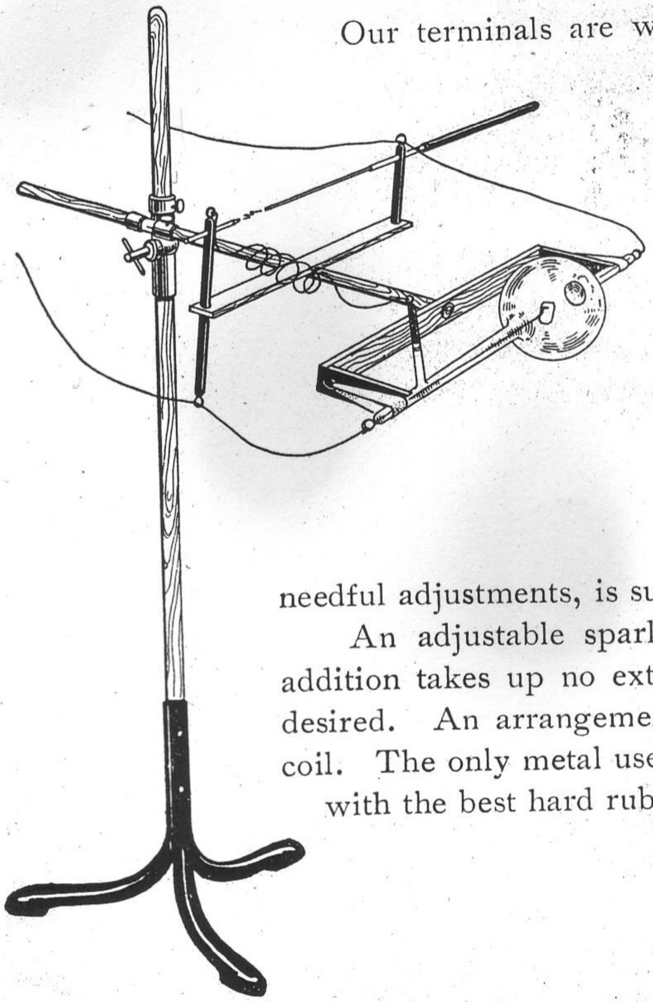
ANODES

The anodes on this type tube will become red or almost white hot if the entire current of the coil be used. This does no harm as the platinum is of the hardest variety known and is supported on a steel rod, which will not bend or become displaced.

ECONOMY

Our tubes are run successfully by the most powerful generators with no trouble from varying vacuum, and experience has proved their use is economical. They are readily repaired, an advantage not possessed by the complicated varieties, and by no means an unimportant consideration. All our tubes are *hand made* from the best German glass, and are carefully annealed and exhausted to just that nice point which gives the best results.

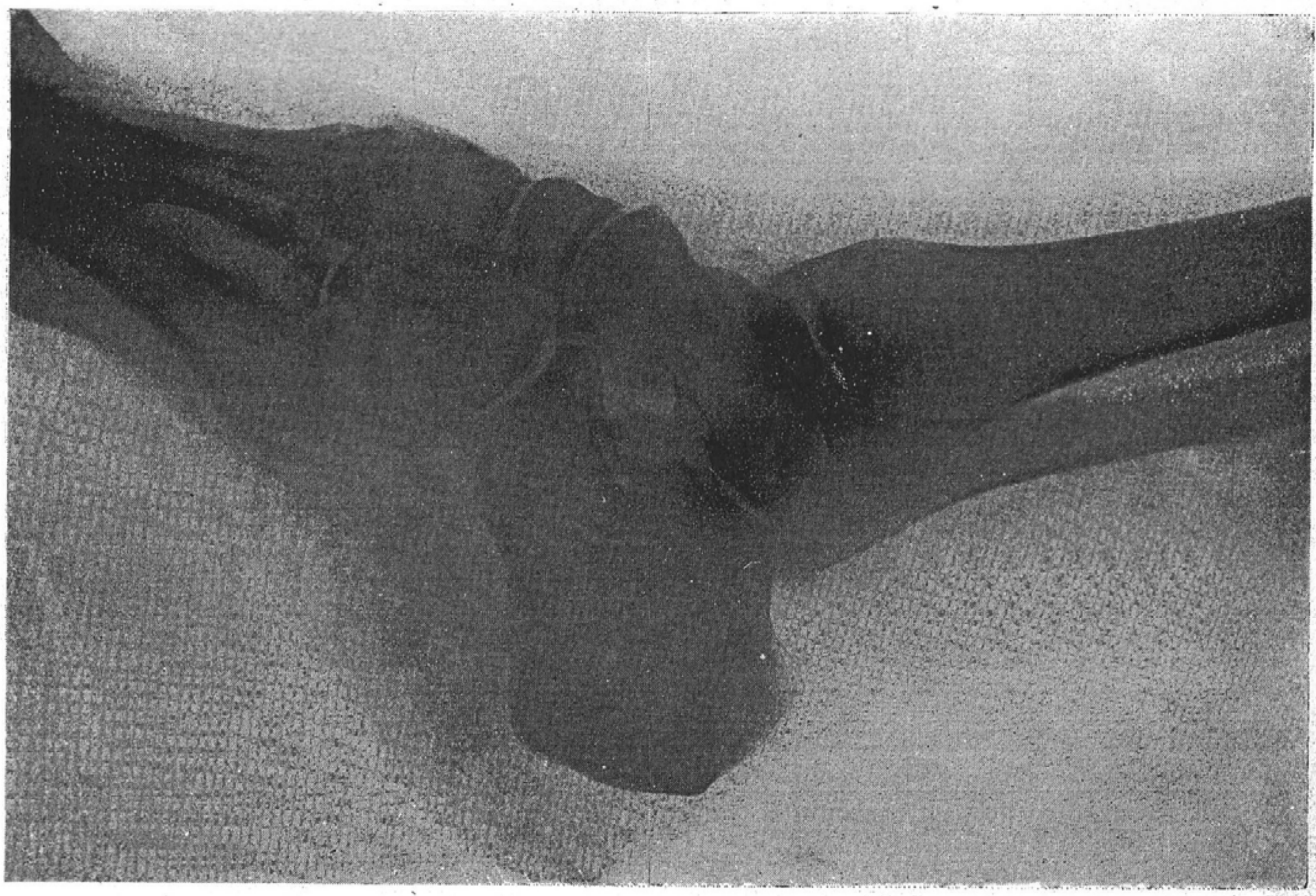
Our terminals are worthy of commendation. We are proud of the mechanical design of our tubes, and extended use shows that they have ample strength exactly where needed. In short, our aim has been to avoid complications of all kinds, and the accompanying cuts show how well we have succeeded.



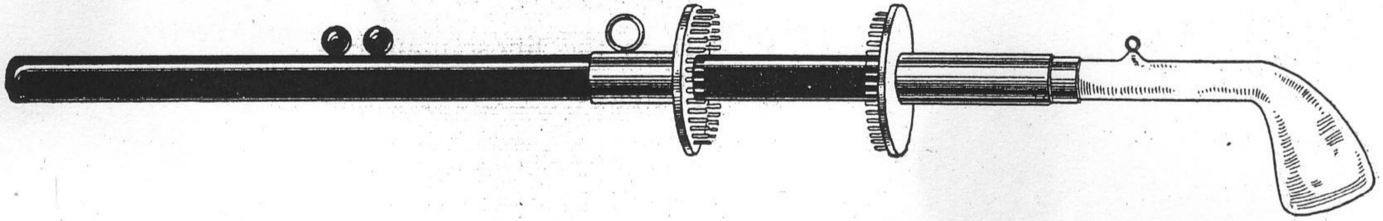
TUBE STANDS

Our experience has shown us that the present tube-holders on the market leave much to be desired for practical every-day work. After much experimenting we have produced a floor stand that is not complicated, has all needful adjustments, is sufficiently rigid, and looks well.

An adjustable spark gap for tube regulations is a valuable feature, and this addition takes up no extra space. By its use the vacuum may be held at any point desired. An arrangement of this sort is a necessity and should be ordered with each coil. The only metal used is the cast iron base. The tubes and wires are well insulated with the best hard rubber, thus increasing the efficiency of the whole apparatus.



FIFTEEN SECONDS EXPOSURE



CODE WORD, KRAENZLER

DR. STRONG'S REGULATING HANDLE

The above handle was devised by Dr. Frederick Strong, of this city, and used by him as a means of regulating the dosage delivered by the various forms of vacuum electrodes.

DISCHARGE

With the plates widely separated, there is little, if any, effect perceptible by the patient, but by bringing them nearer together a beautiful blue discharge takes place, and the amount of current is gradually increased.

The various forms of electrodes illustrated on pages 19 and 21, but without handles and with special base, may be used with this handle.

Price of Handle complete with one No. 14 Electrode, ...	$15.00
Extra Electrodes, each	4.00

PRICE LIST

This apparatus is constructed from the finest materials and finished in the best possible manner. No second grade is made.

COILS

The Kinraide Induction Coil (Direct and alternating currents of all voltages from 20 to 250)	$200.00
500-Volt Coils, extra	20.00

CODE WORDS

52 volts, 7,200 Alternations, Koperig
110 volts, 7,200 Alternations, Koperkies
52 volts, 16,000 Alternations, Koperkleur
110 volts, 16,000 Alternations, Kopermolen
110 volts, 15,000 Alternations, Kopermunt
110 volts, Direct Current, Intardatum
220 volts, Direct Current, Intardetis
235 volts, Direct Current, Intarlando
250 volts, Direct Current, Intarlare
500 volts, Direct Current, Intarlato

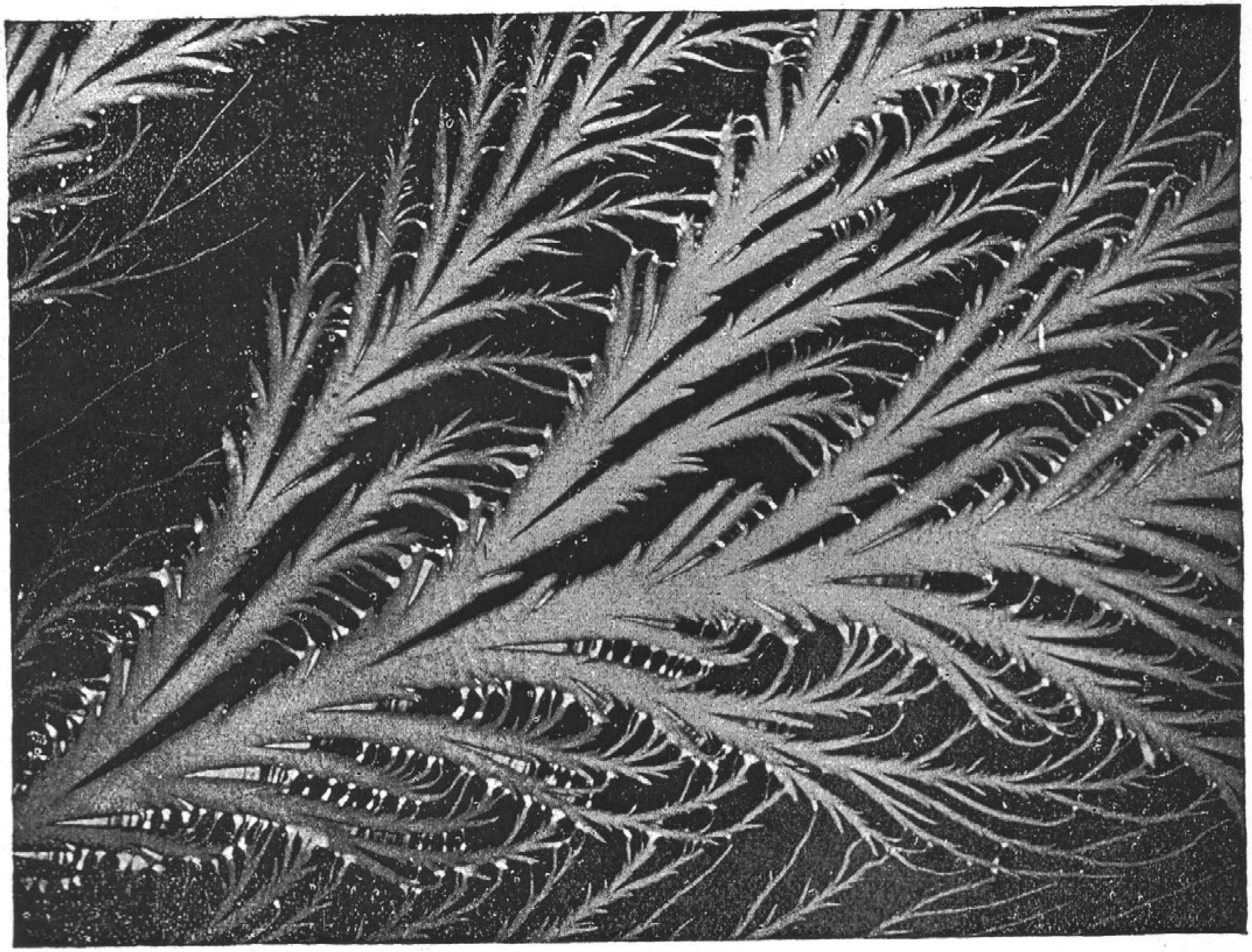
TUBES

K Tube for Direct Current Coil (Code Word, Delustro)	$15.00
H Tube for Alternating Current Coil only (Code Word, Delusively)	18.00
Insulating Cords for Connecting Tubes, per set	1.00

An allowance of $3.00 towards the price of new apparatus will be made for the return of the complete terminals of either of the above tubes.

FLUOROSCOPES

Platinum Barium Cyanide Fluoroscope, 4 x 5 (Code Word, Eapse)	$ 8.00
Platinum Barium Cyanide Fluoroscope, 5 x 5 (Code Word, Earinus)	10.00
Platinum Barium Cyanide Fluoroscope, 5 x 7 (Code Word, Earshrift)	12.50
Platinum Barium Cyanide Fluoroscope, 6 x 6 (Code Word, Earthiness)	13.00
Platinum Barium Cyanide Fluoroscope, 6 x 8 (Code Word, Earthling)	16.00
Platinum Barium Cyanide Fluoroscope, 8 x 10 (Code Word, Earthly)	24.00



POSITIVE DISCHARGE FROM KINRAIDE COIL (REDUCED)

QUALITY

The Platinum Barium Cyanide from which these screens are manufactured is crystalized and re-crystalized before the cardboard is coated; afterwards a protecting varnish is applied, which makes them, in our opinion, the best screens in the country today. These screens are brilliant and lasting, and of very fine grain.

Tungstate of calcium screens will be furnished if desired. These are much cheaper, but we do not recommend them for ordinary work. Price list on application.

X-RAY PLATES

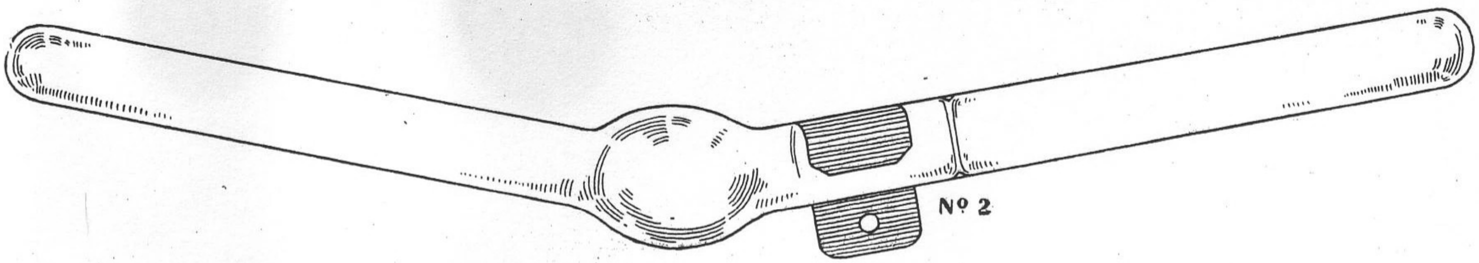
5 x 7, per dozen	$1.40
6½ x 8½, per dozen	2.30
8 x 10, per dozen	3.40
10 x 12, per dozen	5.50
11 x 14, per dozen	7.00
Complete developing and printing outfit, with full instructions for use	5.00

A supply of the above sizes always in stock. These plates are specially wrapped in light proof paper, no plate holder being required for use with the X-ray.

FLOOR TUBE STAND

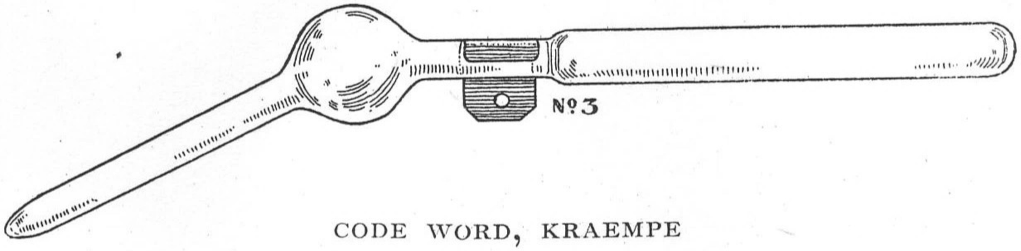
Floor Tube-Stand, with Adjustable Spark Gap (Code word, Finados)	$10.00
A Finely Polished Quartered Oak Table large enough for either of the foregoing outfits, and equipped with ball bearing castors (Code word, Firmandos)	12.00
Rheostat	8.00

HIGH FREQUENCY ELECTRODES



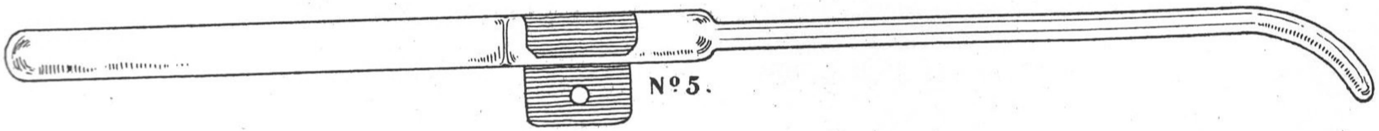
Nº 2

CODE WORD, KRAEMPELN



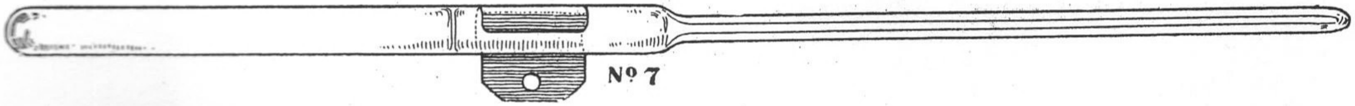
Nº 3

CODE WORD, KRAEMPE



Nº 5.

CODE WORD, KRAENKER



Nº 7

CODE WORD, KRAENKLICH

ELECTRODES FOR HIGH FREQUENCY WORK

No. 14 Vacuum Electrode, for general application	$4.00
No. 2 Vacuum Electrode, for vaginal application	4.00
No. 3 Vacuum Electrode, for rectal application	4.00
No. 11 Vacuum Electrode, for vaginal application, with cuped end	4.00
No. 5 Vacuum Electrode, for urethral application, with curved end	4.00
No. 7 Vacuum Electrode, for urethral application, straight	4.00
No. 15 Vacuum Electrode, for eye application	4.00
Nos. 17 and 18 Two Geissler Vacuum Electrodes, highly colored for giving general tonic treatment	4.00
One pair Metal Handles and Cords	1.00
Special Electrodes for any purpose and of any shape made to order; price on application	
Set of eight Electrodes, Metal Handles and Cords	25.00

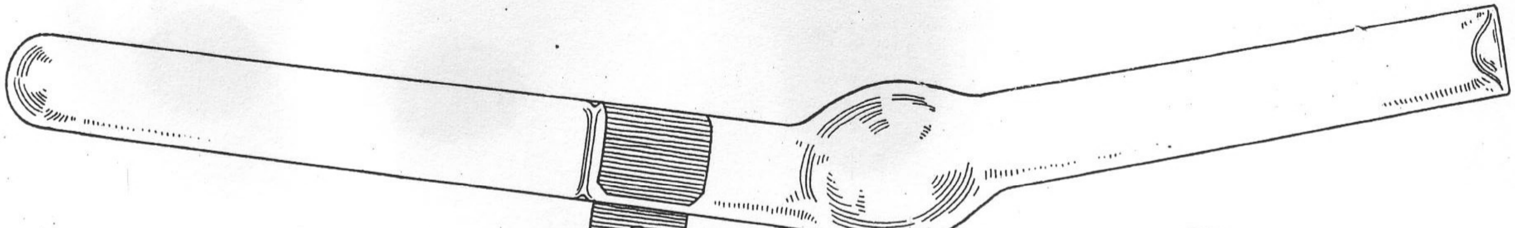
SAMPLE OUTFITS

OUTFIT NUMBER TWENTY-ONE (Code Word, Unproposed)

FOR DIRECT CURRENT—

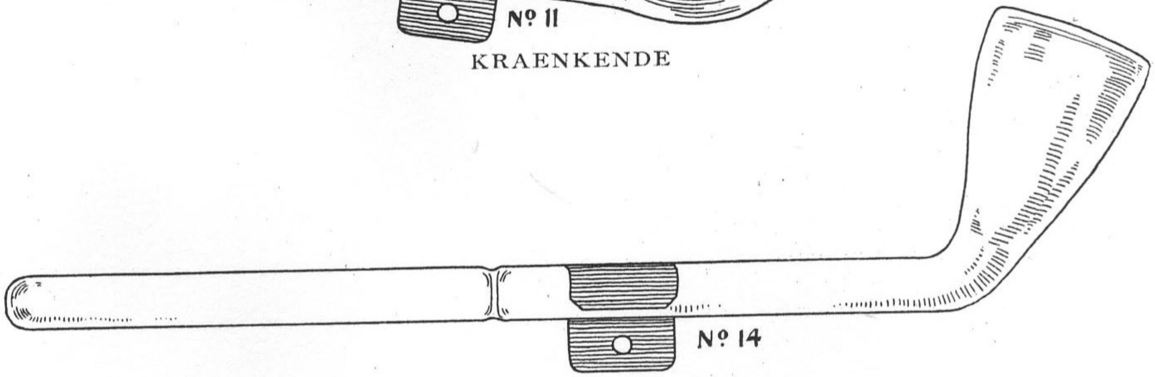
One (1) Direct Current Kinraide Coil	$200.00	
Two (2) Tubes, Type K	30.00	
One (1) 5 x 7 Platinum Barium Cyanide Fluoroscope	12.50	
One (1) Floor Tube Stand, with adjustable Spark Gap for controlling vacuum	10.00	$252.50

HIGH FREQUENCY ELECTRODES



Nº 11

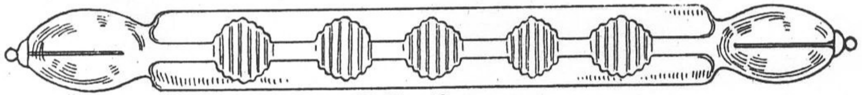
KRAENKENDE



Nº 14

KRAEMERIN

No. 15. CODE WORD, KRAENKUNG



Nº 17 - 18

CODE WORD, KRAENZCHEN
CODE WORD FOR SET, KRAENZEN

OUTFIT NUMBER TWENTY-TWO (Code Word, Vestiaires)

FOR ALTERNATING CURRENT—

One (1) Alternating Current Kinraide Coil	$200.00	
Two (2) Tubes, Type H	36.00	
One (1) 5 x 7 Platinum Barium Cyanide Fluoroscope	12.50	
One (1) Floor Tube Stand, with adjustable Spark Gap for controlling vacuum	10.00	$258.50

A rheostat for regulation is recommended for use with either of the above outfits.

OUTFIT NUMBER TWENTY-THREE (Code Word, Unprovide)

FOR DIRECT CURRENT—

One (1) Direct Current Kinraide Coil	$200.00	
Two (2) Tubes, Type K	30.00	
One (1) 6 x 8 Platinum Barium Cyanide Fluoroscope	16.00	
One (1) Floor Tube Stand	10.00	
One (1) Rheostat	8.00	
One (1) Quartered Oak Table	12.00	
One (1) Set of Three Electrodes, Nos. 14, 17 and 18	8.00	$284.00

OUTFIT NUMBER TWENTY-FOUR (Code Word, Vestiairo)

FOR ALTERNATING CURRENT—

One (1) Alternating Current Kinraide Coil	$200.00	
Two (2) Tubes, Type H	36.00	
One (1) 6 x 8 Platinum Barium Cyanide Fluoroscope	16.00	
One (1) Floor Tube Stand	10.00	
One (1) Rheostat	8.00	
One (1) Quartered Oak Table	12.00	
One (1) Set of Three Electrodes, Nos. 14, 17 and 18	8.00	$290.00

In ordering coils give *voltage of circuit, whether direct or alternating; if alternating, the number of alternations.*

Full directions for operating accompany each coil.

We want our customers to feel perfectly free at all times to call upon us for expert advice on all things pertaining to the operation of X-ray outfits.

The factory where our goods are manufactured is well equipped with the finest tools and latest facilities for our business.

CATALOGUES If interested in static machines and electro-therapeutical apparatus in general send for Bulletin Number Twenty-Four. Static tubes, Bulletin Number Twenty-Five.

SUPERIORITY In therapeutics it is generally conceded that the Kinraide Coil is superior to all other apparatus in as much as the current may be used to excite the various high frequency electrodes for both internal and external uses. Pictures of a few of the various forms of electrodes will be found on preceding pages.

THERAPEUTICS For treating cancer, lupus, the various forms of skin diseases and the removal of superfluous hair, the coil and X-ray tube have a very broad field. The numerous forms of regulation, the reliability and the great quantity of X-rays generated, make the apparatus a most necessary part of a well-equipped office.

Coils in general and the Kinraide Coil in particular are conceded by those best posted in this sort of work to excel all other instruments.

TERMS

Prices in this catalogue are net.

Remit by money order, express or by New York draft. Add twenty-five cents to face of all checks, except on New York or Boston, to cover collection charges.

REFERENCES Customers unknown to us must give satisfactory references, or send draft with order, for which we will allow five per cent. discount. We will ship C. O. D., provided a remittance of twenty per cent. accompanies order. Charges for return of money to be borne by purchaser.

Goods will be delivered f. o. b., freight or express, Boston, Mass. No charge for packing. Each piece of apparatus is carefully packed and no allowance will be made for loss or breakage in transit.

Western Union Telegraph code used. Telegraph and cable address, "Swettxray."

MURRAY AND
EMERY COMPANY
BOSTON

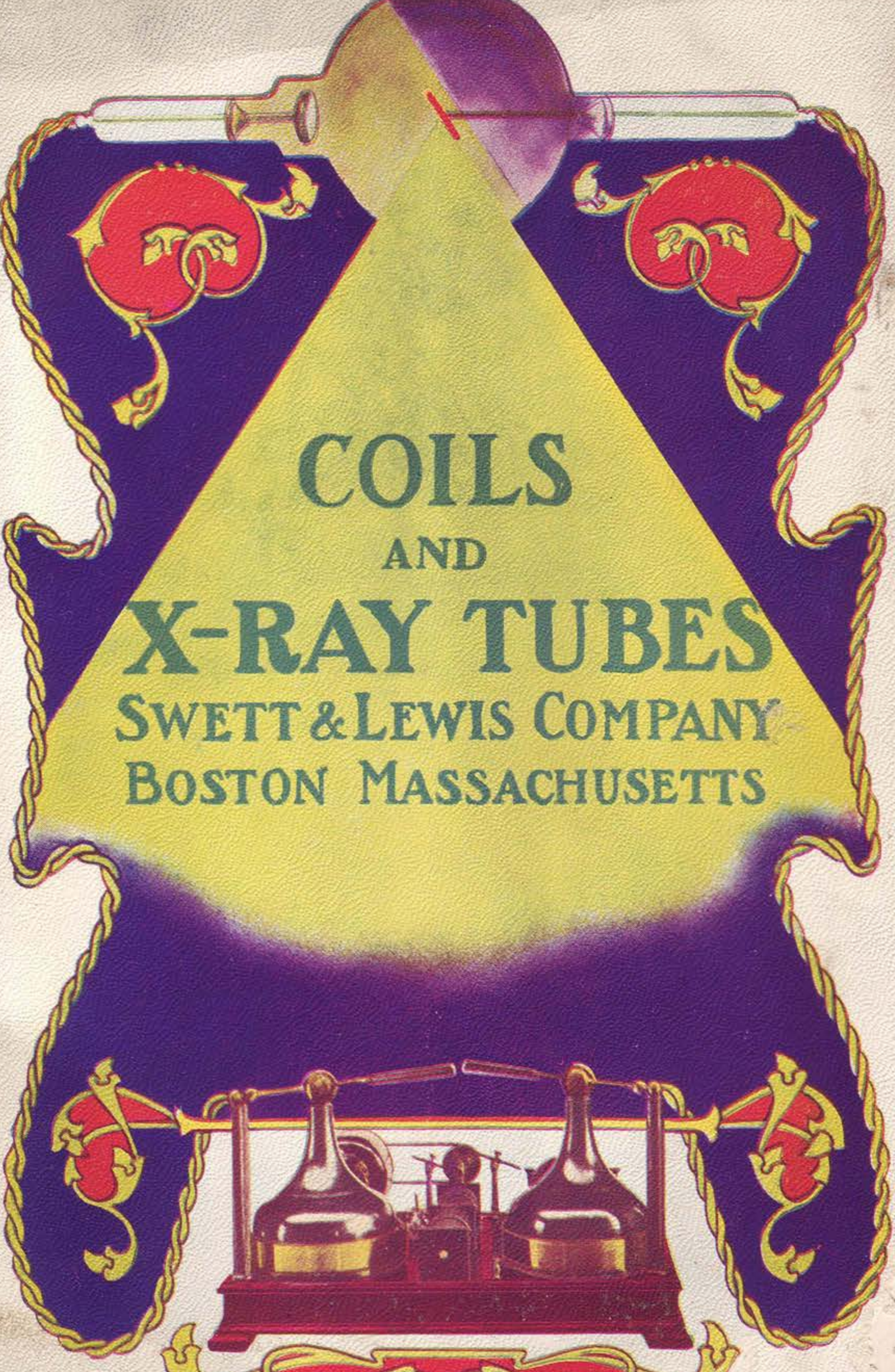
BLOCK TIN For X-Ray Therapy. Per pound, 75 Cents

SWETT & LEWIS COMPANY.

The Kinraide Coil

18 BOYLSTON ST.
BOSTON.

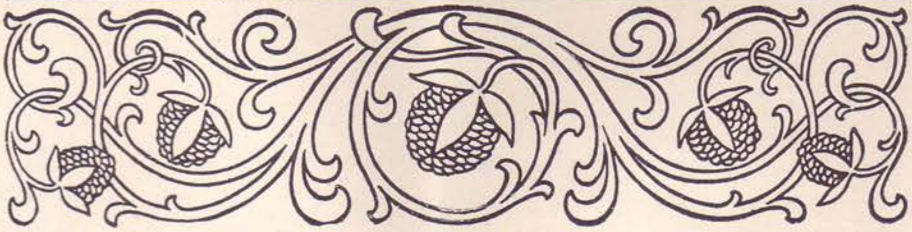
This material is specially rolled for us and is of the proper thickness for use in treating cancer, lupus and all diseases where the X-Ray is used. It is much lighter than lead, is as flexible, and remains clear and bright.



COILS
AND
X-RAY TUBES

SWETT & LEWIS COMPANY
BOSTON MASSACHUSETTS

Coils and Tubes



Bulletin Number
Thirty-three

MANUFACTURED BY

Swett & Lewis Company
Eighteen Boylston Street, Boston, Massachusetts

TERMS

❡ Prices in this bulletin are net.

❡ Remit by express or post-office money order or by New York draft. Add twenty-five cents to face of all checks, except on New York or Boston, to cover collection charges.

REFERENCES

❡ Customers unknown to us must give satisfactory references, or send draft with order, for which we will allow five per cent discount. We will ship C. O. D., provided a remittance of twenty per cent accompanies order. Charges for return of money to be borne by purchaser.

❡ Goods will be delivered f. o. b. freight or express, Boston, Mass. No charge for packing. Each piece of apparatus is carefully packed and no allowance will be made for loss or breakage in transit.

❡ Western Union Telegraph code used. Telegraph and cable address, " Swettxray."

❡ When in Boston, we shall be glad to have you make your headquarters at our office.

BULLETINS

❡ We should be glad to send the following bulletins to all interested. Preceding bulletins are out of date.

Number Twenty-eight	Kinraide Coil and Accessories.
Number Twenty-nine	" Why ? " A List of Testimonials.
Number Thirty	Directions for Operating Coil.
Number Thirty-one	List of Sample Coil Outfits.
Number Thirty-two	Electrical Novelties
Number Thirty-three	This one.
Number Thirty-four	Finsen and Violet Ray Apparatus.

❡ This latter bulletin will be up-to-date and will include several new and improved pieces of apparatus. Be sure and get it before purchasing.

❡ Your special attention is called to the announcement on page 19 of this bulletin, and to note the greatly reduced price of the Kinraide Coil.

❡ Note rebate for return of tube terminals, on page 9.

❡ Prices in this bulletin supersede all others.

Copyrighted, 1903, by Swett & Lewis Company

X-Ray Tubes

The question of X-ray tubes is a most important one, especially as many of the users are at so great a distance from the manufacturer. It is with pleasure we have to announce that we have been in the business of tube manufacture since early in 1896, and have sold many thousand satisfactory tubes.

We are better fitted now, than ever before, to supply tubes of all kinds, as the factory is equipped with new and improved machinery and a corps of skilled men. The tubes are made with great care and selected to fit each case.

The external terminals of all the tubes are very strong and heavy, and the user may rest assured that there will be no trouble from breakage at this point. The glass used is of the finest kind, and offers little or no obstruction to the passage of the X-ray.

In the following pages, we shall illustrate our standard tubes for various pieces of apparatus. Special tubes for experimental work to order.

The bulbs are all hand-blown, and are as thin as it is possible to get them, and yet be sure that they will withstand the atmospheric pressure and the shocks of shipment.

The bulbs are well proportioned, and are uniform in size. No very large bulbs are made, as our experience has shown that nothing is gained, and strength is sacrificed. A little calculation will show that the total pressure on a bulb of eight inches or more in size is enormous, and unless the walls of the tube are very thick, the danger of collapse is great. Thick walls mean obstruction to the rays.

Great care is taken in pumping all of the tubes manufactured by us, and as a result they have a nearly stable vacuum. This fact is a great help to the user.

Adjustable Vacuum Tubes

Adjustments may be divided into two classes; those which are dependent on a chemical as a means of lowering the vacuum, and those which are dependent on the porosity of a platinum tube. The tubes listed in this bulletin may be furnished either way, but with the static tubes the latter method is advised.

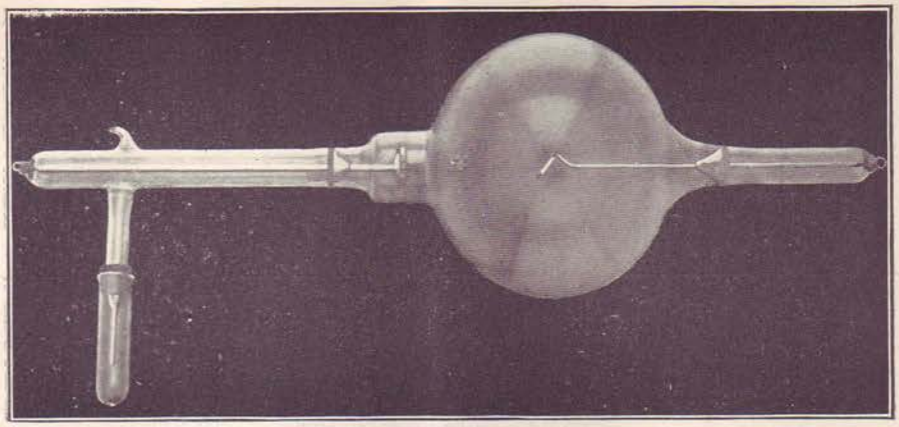
With the chemical adjustment, a glass tube is attached to the main or X-ray tube and partly filled with a chemical which gives off a gas when heated, and re-absorbs it on cooling.

Two methods may be used to operate this adjustment. The first is heating the adjusting bulb with the flame of a lamp or a match. The only objection to this is that too much gas may be driven off. The second, and better way, is to allow a spark from the coil or static to pass through the chemical. By this means, very close regulation may be had.

With the other regulator, a very thin platinum tube is sealed on to the main tube in the same position as the chemical regulator. When not in use, this regulating tube is protected against mechanical injury by a glass cap.

If the vacuum be too high, the platinum tube may be heated with a flame until it gets nearly or quite red hot. A little gas passes through the walls of the platinum tube into the X-ray tube and ceases instantly upon the removal of the flame. If the tube is excited while this is being done, the vacuum may be lowered to just the desired point. No gas is re-absorbed, so that there will be little or no rise in vacuum if the tube is allowed to stand. The opposite is true with the chemical regulator.

It is strongly advised that tubes be purchased with regulators of some kind as the life of the tube is much longer, better satisfaction is secured in operation and a large portion of the repair charges may be saved.



Type D, for Largest Static Machines

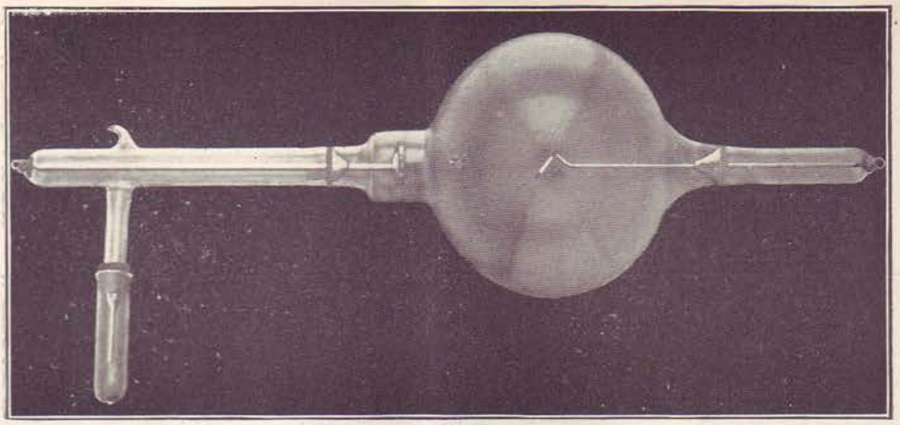
This tube is an improvement over the old Type J, which has been on the market for some years. The bulb is about five and one-half inches in diameter and the tube eighteen inches long. The great length is an advantage, as it prevents the current from passing over the outside of the glass, and prevents puncture.

The anode is of large size and supported in such a way that its surface is smooth, thus insuring sharp definition and accurate focus. The cathode is of good size, very thick, of proper curvature, and placed in proper relation to the walls of the tube.

Both anode and cathode terminals are supported near their entrance into the bulb, so that it is impossible to get them out of place without breaking the tube. This is an especially good tube for long distance shipments.

These tubes are specially recommended with the platinum regulator. When the regulator is used, they are sent out with a high vacuum, and may be lowered to just the right point to fit the machine and work in hand at that time.

Type D with adjustment	$11.00.	Code word, Demeterent
Type D without adjustment . . .	9.00.	Code word, Demeter



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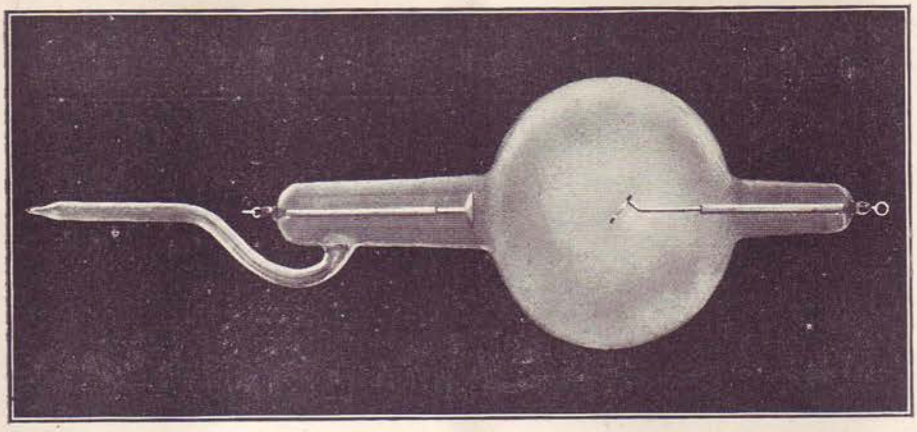
Type D with adjustment	$11.00.	Code word, Demeterent
Type D without adjustment . . .	9.00.	Code word, Demeter

The detail and definition obtainable are unsurpassed and the tube is bound to be a general favorite with all static machine users.

Type J will be no longer manufactured and the D tube will be sent in all cases when the older form is ordered.



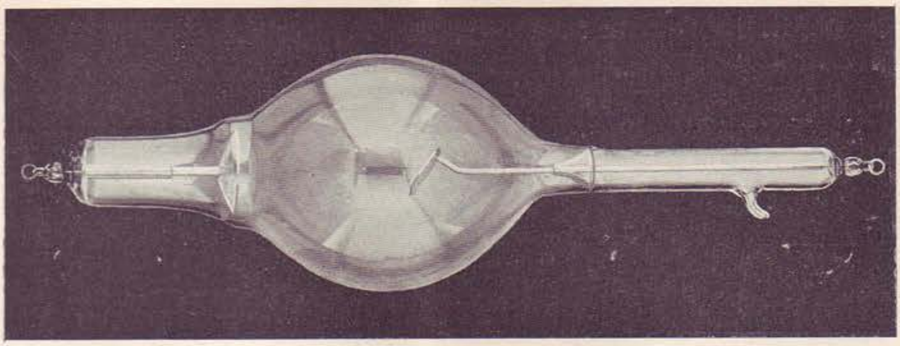
Type M, for Large Static Machines

This tube is probably as well known as any now on the market, and has been seen or used by the majority of X-ray operators.

The bulb is about five and one-half inches in diameter, and the tube, including handle, fifteen inches long. What was said regarding the terminals of Type D fully applies to this tube, except that they are not supported at their entrance to the bulb.

The tube is essentially for static use, and is without doubt the best on the market, for a low cost. The definition and detail obtained are excellent.

Price without adjustment	$8.00.	Code word, Demesnial
Price with adiustment	10.00.	Code word, Demetendum



Type W, for Medium Size Static Machines and Small Coils

This tube is really a small size D and is intended for static machines, of about six revolving plates, and small coils. Size, four inches in diameter, fourteen inches long.

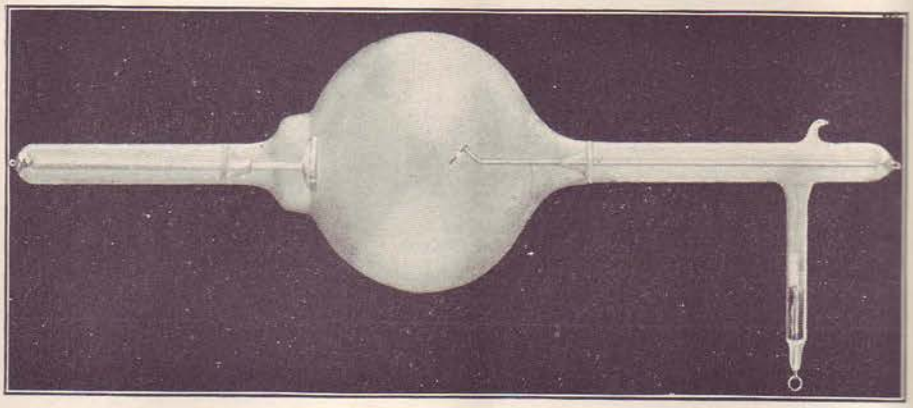
Price with adjustment	$8.75.	Code word, Demouvoir
Price without adjustment	6.75.	Code word, Demouler

Type S, for Small Static Machines and Coils

This tube is still smaller, being three and one-fourth inches in diameter and twelve inches long. Very many of these have been sold and are giving good satisfaction.

Price with adjustment	$7.00.	Code word, Dempsters
Price without adjustment	5.00.	Code word, Demoveo

The terminals of this tube are made with as great care as in the larger and more expensive tubes. This size is recommended for all small apparatus.



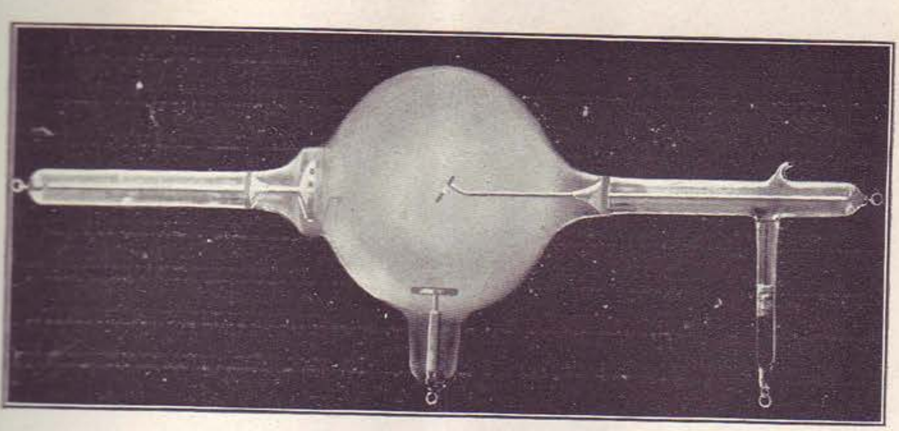
Type K, for Large Direct Current Coils

This tube is of the same size and shape as the Type D, but is designed for much heavier work. The anode is made of very heavy platinum, supported on a steel rod. It may be heated to a bright red, and held at this point for a long time without danger of injury to the tube or anode. The definition and penetration are exceptionally good.

The tube is fitted with a chemical adjustment, which may be operated either by heat or spark. The vacuum may be held at any desired point for long periods. If too much gas is driven off, it will be reabsorbed, if the tube is allowed to rest for a short time.

Price	$12.00.	Code word, Delustro

The platinum tube regulator may also be used with this and the following tube, and will be furnished for the same price. In ordering, please specify which kind of regulator is desired. The chemical regulator will be furnished in all cases unless otherwise ordered.



Type H, for Alternating Current Coils only

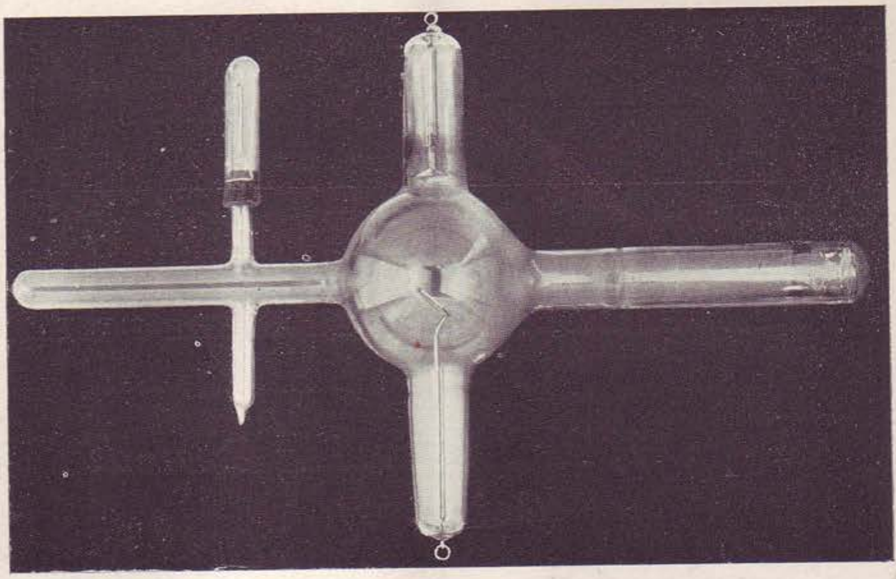
This tube is the same as Type K, except that a second cathode is placed back of the anode, and may be used in connection with the anode, or separately, as desired. If the second cathode is used as recommended, the life of this tube is much extended, and a large portion of the blackening is prevented. This tube will stand as hard usage as the previous one. The definition and penetration are fine.

Price	$14.00.	Code word, Delusively

A credit of ten per cent will be allowed from the purchase price of all tubes listed in this bulletin for the return of the complete terminals of a broken tube of the same kind.

This rebate will be allowed only toward the price of new tubes purchased at time of return of old terminals, and will in no case be paid in cash.

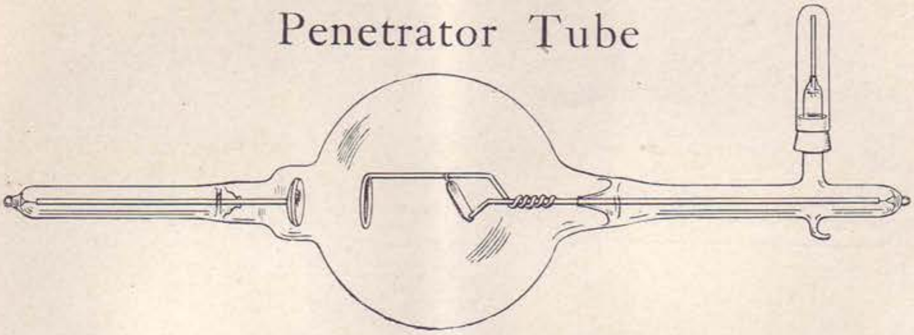
X-Ray Tubes for Cavities



To meet the demand for a tube that may be used in the throat or vagina, we have designed a simple, strong, and convenient one. The bulb and all but the end of the tube are made in such a way that they are opaque to the X-ray. The end of the tube, however, is transparent to the ray, and may be brought nearly, or quite, into direct contact with the diseased area. This reduces the time necessary for exposure, and increases the efficiency of the treatment. The terminals are so situated that the wires may be kept well away from the patient. The tube is substantially built, and the platinum tube regulator is supplied in all cases. This tube is recommended for work where small areas are to be treated, or for internal work.

Price	$14.00	Code word, Demureness

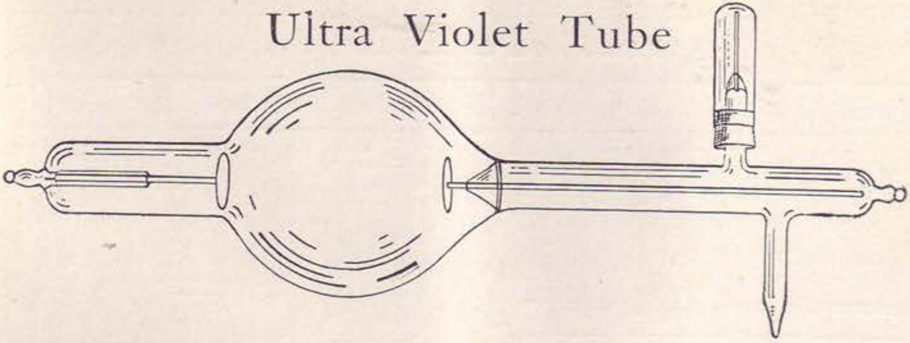
Penetrator Tube



Many users of tubes claim that the insertion of a ring of metal between the cathode and anode, and attached to the latter, will give the tube greater penetration at a low degree of vacuum.

This attachment may be added to any of the regular forms of tubes for an additional price of	$0.75

Ultra Violet Tube



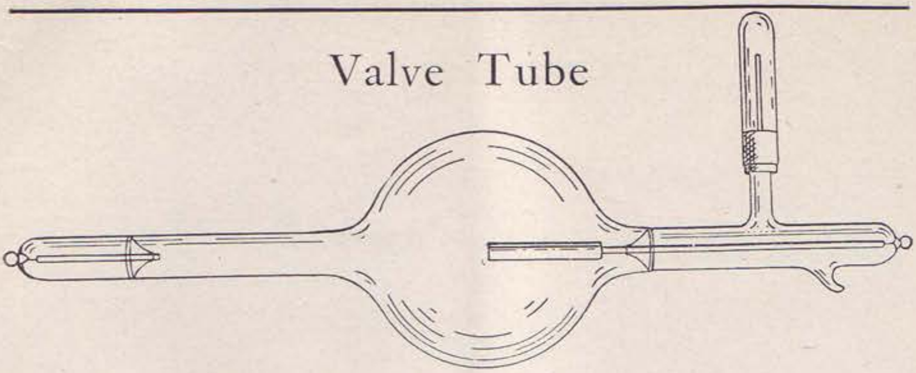
The above tube is filled with special gases before exhaustion and when excited by either a coil or static, in the same manner as an X-ray tube, gives off a great quantity of Ultra Violet rays.

A platinum barium cyanide screen will fluoresce brilliantly in any part of a large room with one of these tubes running.

A regulating device is furnished with this tube, as shown in cut, so that the vacuum may be held at any point. When running, the color effect in the tube is brilliant and striking. Useful in treating skin diseases.

Price	$7.00	Code word, Dentones

Valve Tube

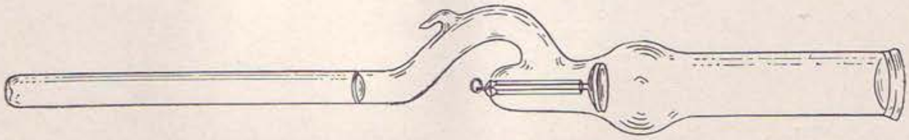


By introducing one of these tubes in series with an X-ray tube excited by a coil, many or all of the reverse waves may be chocked back or totally retarded. Tubes similar to this are much used by foreign operators.

The resistance of these tubes depends on the method of connection. With the current flowing in one direction it may be as high as three inches; in the other direction only a quarter of an inch. A vacuum regulator is furnished on each tube.

Price . . . . $7.00 Code word, Depontabas

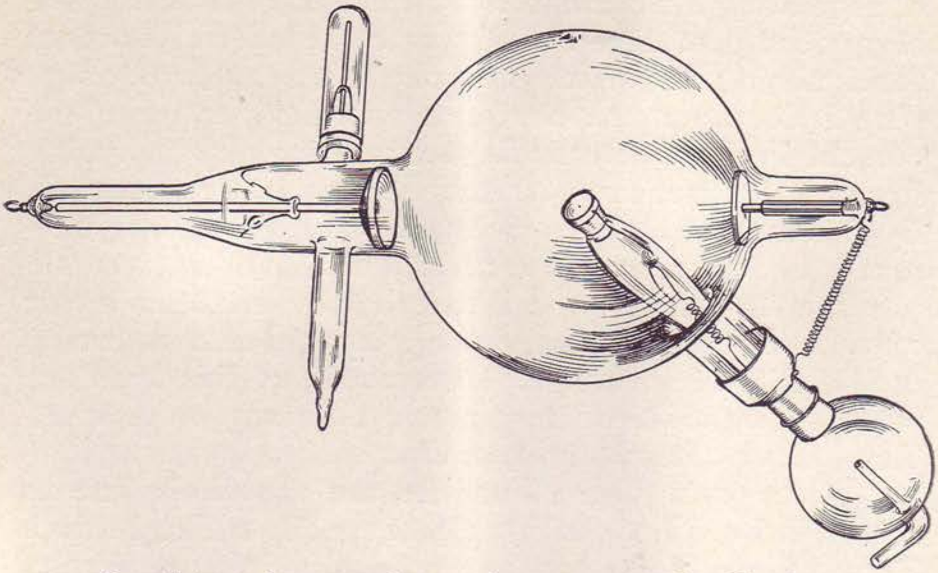
Lens Tube *(Patented)*



As shown in the illustration, the electrode is not dissimilar to No. 2, page 15, except that its end is flat and of crystal, which will allow the Ultra Violet rays to pass through the end of the tube only. Wherever the tube touches the patient, the high frequency effects are obtained and a plentiful stream of Ultra Violet rays is thrown through the lens. In ordering, state diameter wanted. It is manufactured in sizes up to one and a half inches in diameter. The electrode may be operated on either coil or static machine.

Price . . . . $10.00 Code word, Desempeco

Water Cooled Tube



In this tube we have incorporated all the good points of our other tubes, including massive anode, supported cathode and the platinum tube adjustment.

A large amount of water is brought into direct contact with the anode, thus keeping it cool even under very hard usage. The water reservoir holds a comparatively large amount, affording a good opportunity for circulation. The tube may be run long and hard without lowering the vacuum.

Price	$30.00	Code word, Derivamos

A credit will be allowed for return of terminals in case of breakage.

Vacuum Electrodes

To meet the demand for a high-grade, substantial vacuum electrode, we have designed and manufactured those shown in the following cuts. These electrodes are made from a special glass, which prevents puncture. They are carefully pumped to the right degree of vacuum to produce the best color effects.

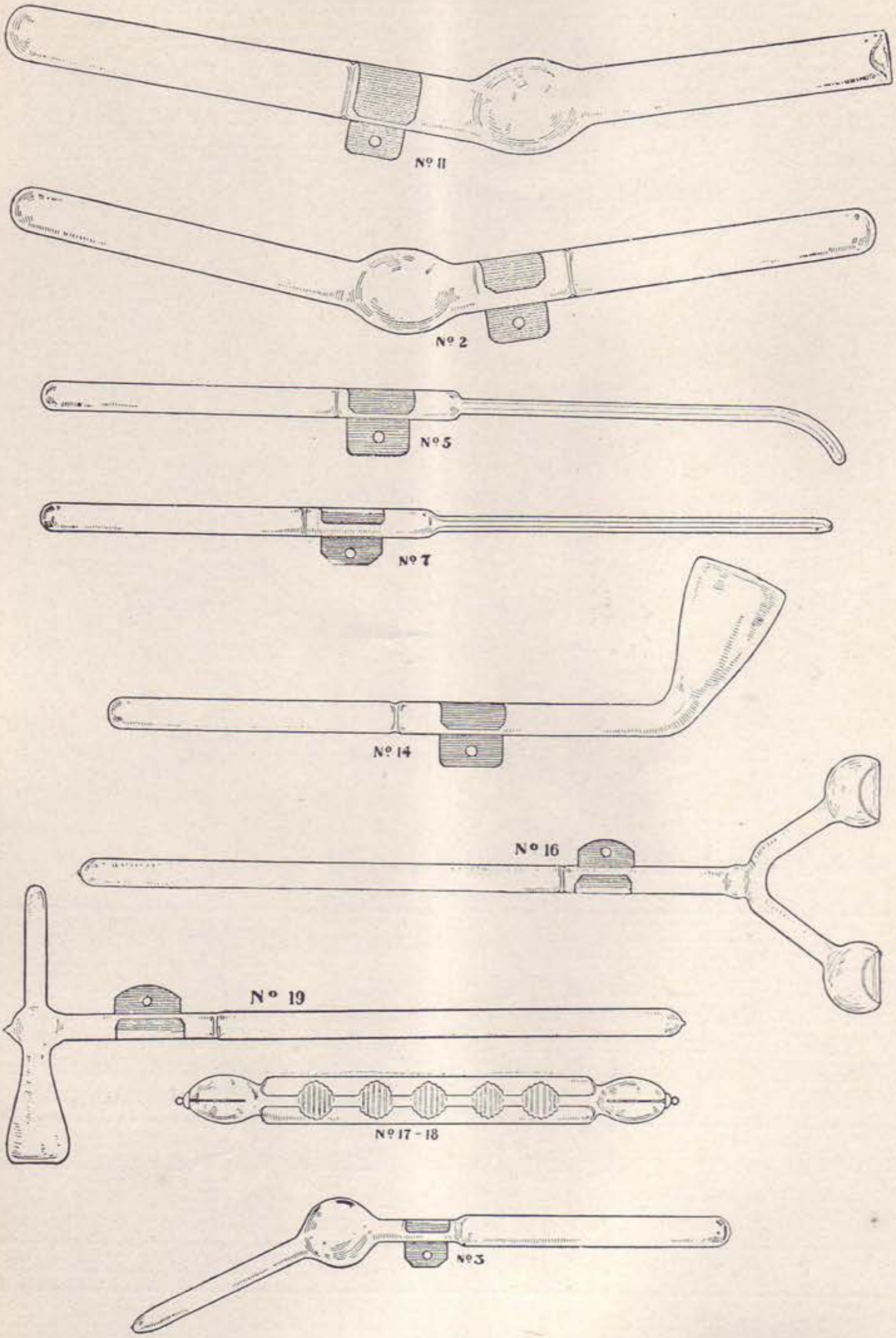
Special attention is called to the improved method of regulating the current in the electrode itself. It will be noticed that there is a copper clip on each electrode, for attaching the wire. This clip is movable. By slipping it down on the handle a half inch or more, the current in the electrode is weakened, and by slipping it up on the vacuum part, the current is strengthened. By this method of regulation, the strength of the current is under the absolute control of the operator.

It will also be noticed that the handle forms a part of each electrode, thus making it rigid and reducing the liability of breakage. Electrodes of this kind are more substantial and last better than any other kind. The handle contains no vacuum.

Electrodes Nos. 17 and 18 are especially fine in color effects. In ordering, please specify colors desired. They can be furnished in green, blue, red, or purple.

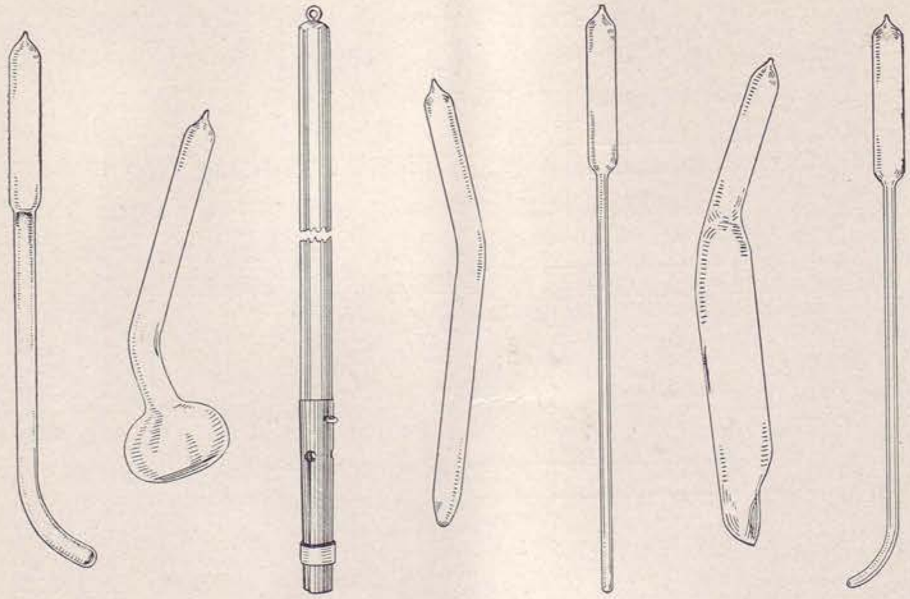
No. 14	For general application . .	$2.00.	Code word, Kræmerin
No. 2	For vaginal application . .	2.00.	Code word, Kræmpeln
No. 3	For rectal application . .	2.00.	Code word, Kræmpe
No. 11	For vaginal application, with cupped end . . .	2.00.	Code word, Krænkende
No. 5	For urethral application, with curved end	2.00.	Code word, Krænker
No. 7	For urethral application, straight,	2.00.	Code word, Krænklich
No. 15	For eye application . .	2.00.	Code word, Krænkung
No. 16	Double Eye Electrode . .	2.00.	Code word, Krætze
No. 19	Hammer Electrode . . .	2.00.	Code word, Krætzig
No. 18	Geissler Electrode, for general tonic treatment . . .	2.00.	Code word, Kourilien
No. 17	(Not so highly colored as No. 18)	2.00.	Code word, Kourgan
No. 1	For use around the spine. Shaped like a tuning fork .	2.00.	Code word, Krænseln
One pair Metal Handles and Cords .		1.00.	
Set of ten Electrodes, Metal Handles and Cords, ...		20.00.	Code word, Krænzen

Electrode No. 19 is most useful, as its shape permits of its being used for a great variety of work.


Nº 11
Nº 2
Nº 5
Nº 7
Nº 14
Nº 16
Nº 19
Nº 17-18
Nº 3

Vacuum Electrodes

To meet the demand for vacuum electrodes to fit into a common handle, we have produced the following set of six of the ones most used. The general design is the same as of those illustrated, except that the electrodes are made lighter, and as short as possible, and yet retain the good features.



The electrodes are as follows:

	Handle	$1.25.	Code word, Koulbac
No. 3A	Rectal (without bulb)	1.25.	Code word, Kouler
No. 5A	Urethral, curved	1.25.	Code word, Koulougli
No. 7A	Urethral, straight	1.25.	Code word, Koumiss
No. 11A	Vaginal, with cupped end	1.25.	Code word, Koupara
No. 14A	General external work	1.25.	Code word, Koupholite
No. 20A	Eustachian	1.25.	Code word, Kourakin

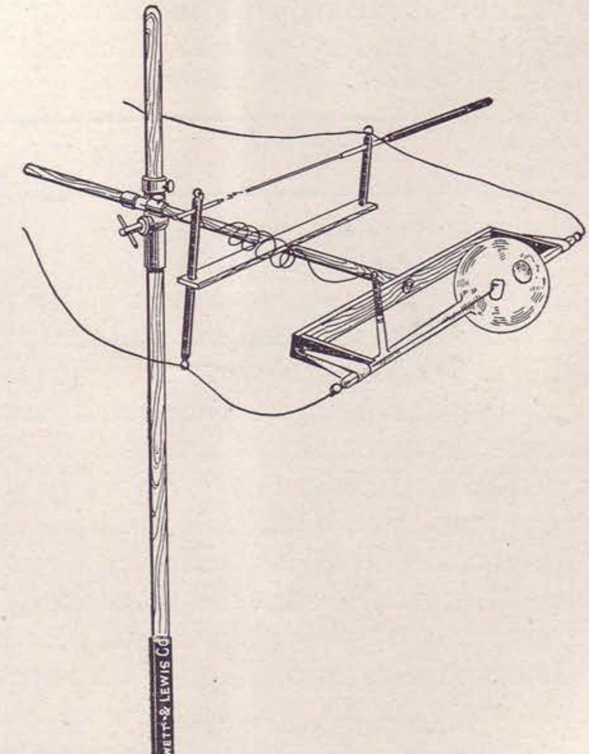
A firm insulating handle, fitted with a universal coupling, will complete the set.

Price for Set and Handle	$5.00.	Code word, Koukarien

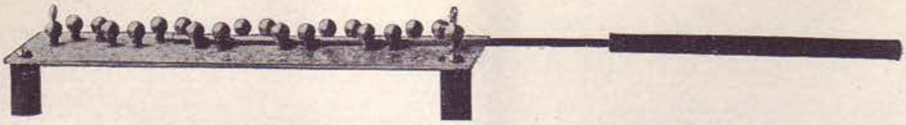
Special electrodes for any purpose, and of any shape, to order; price on application.

Tube Stands

In connection with the adjustable vacuum tubes using the chemical adjuster, and with those used with the Kinraide Coil, we would advise the floor tube stand shown in cut, as it has in combination with it a regulator so arranged that the vacuum in the tube may be held at any point desired.



Floor Tube Stand, with Adjustable Spark Gap,	$10.00	Code word, Finados
Set of Cords, heavily insulated . . .	1.00	Code word, Finances
Small Wood Tube Stand	2.00	Code word, Finage
Arm, 3 feet long, for use in place of ball and point in stand usually furnished with static machines	1.50	Code word, Finalista



Multiple Spark Interrupter

This device is specially valuable in running X-ray tubes from static machines. By its use a very low or very high vacuum tube may be made to light up in a fine manner, and is under instant and complete control of the operator.

Price each, complete, with full working directions . . . . . . $5.00. Code word, Clisobra

Books

Electro-Static Modes of Application, Therapeutics, Radiography and Radiotherapy, by William Benham Snow, M.D. Price,	$3.00
High-Frequency Currents in the Treatment of Some Diseases, by Chisholm Williams, F.R.C.S. Edinburgh. Price, .	2.75
Electro-Therapeutical Practice, by Chas. S. Neiswanger, Ph.G., M.D. Price, . .	1.50
Medical and Surgical Uses of Electricity, including the X-Ray, Finsen Light, Vibratory, Therapeutics and High-Frequency Currents, by A. D. Rockwell, A.M., M.D. Price, ...	5.00
Advanced Therapeutics. A Journal devoted to Electro-Therapeutics, Radiography, Thermo-Therapeutics, Hydro-Therapeutics, Climatology and Therapeutic Exercise. Price, per year, ...	2.00
Archives of the Roentgen Ray (London.) Price, per year, ...	4.00

Any of the above will be sent to any address, postage paid, on receipt of order. Cash must accompany the order.

Announcement

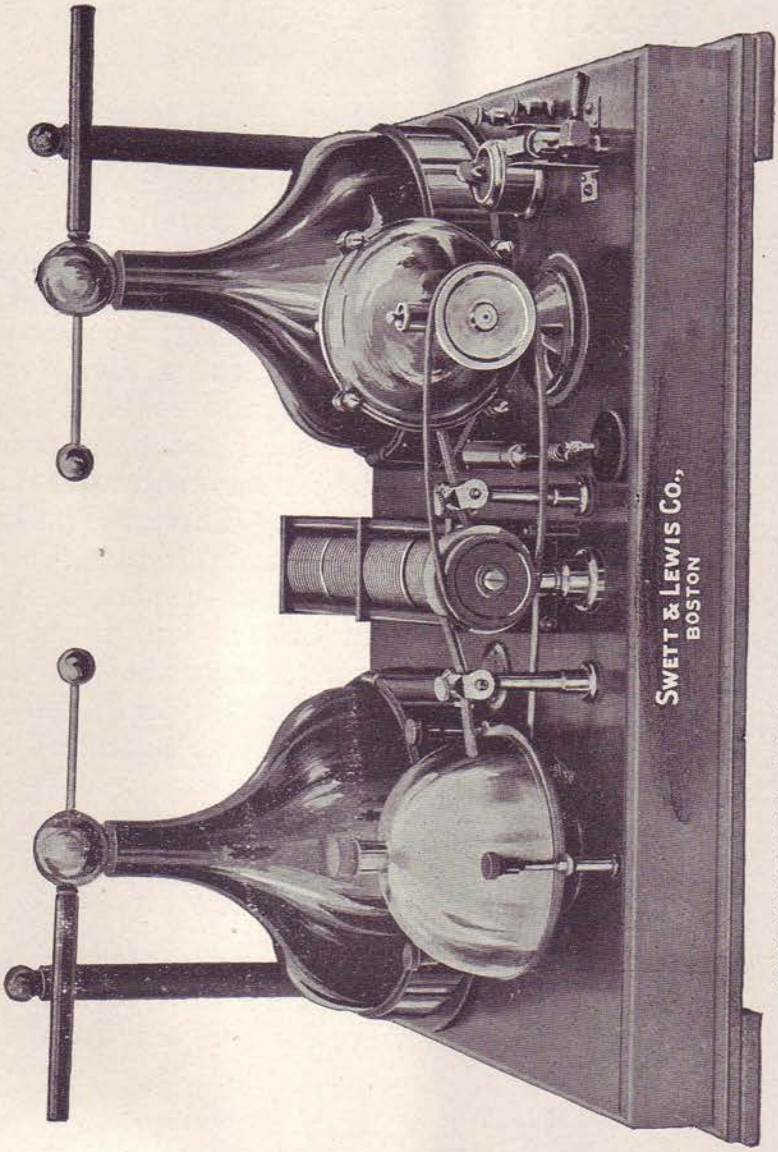
Your attention is respectfully called to the change in price of the Kinraide Coil and Coil Tubes. Owing to the very great demand for this apparatus, the inventor, Mr. Kinraide, has received more in royalties for his patents than was expected, and he has very kindly consented to give the medical profession the benefit of this. On our part, we, too, are making a reduction. We are able to do this largely for the reason that a number of very expensive moulds and special pieces of machinery which were necessary in order to manufacture the apparatus, have paid for themselves, making the cost of production much less. The apparatus is manufactured on the duplicate plan, all parts being interchangeable where possible, and made in large quantities. We hope that our efforts will be appreciated, and that you will continue to favor us with your orders. We wish to assure you that the quality will be fully maintained in the future, as in the past, and that the Coil will not be cheapened in any way.

Guarantee

With each Coil furnished, a guarantee will be given against any defect in workmanship or material, or against burn out in any way, for one year from date of shipment.

Construction

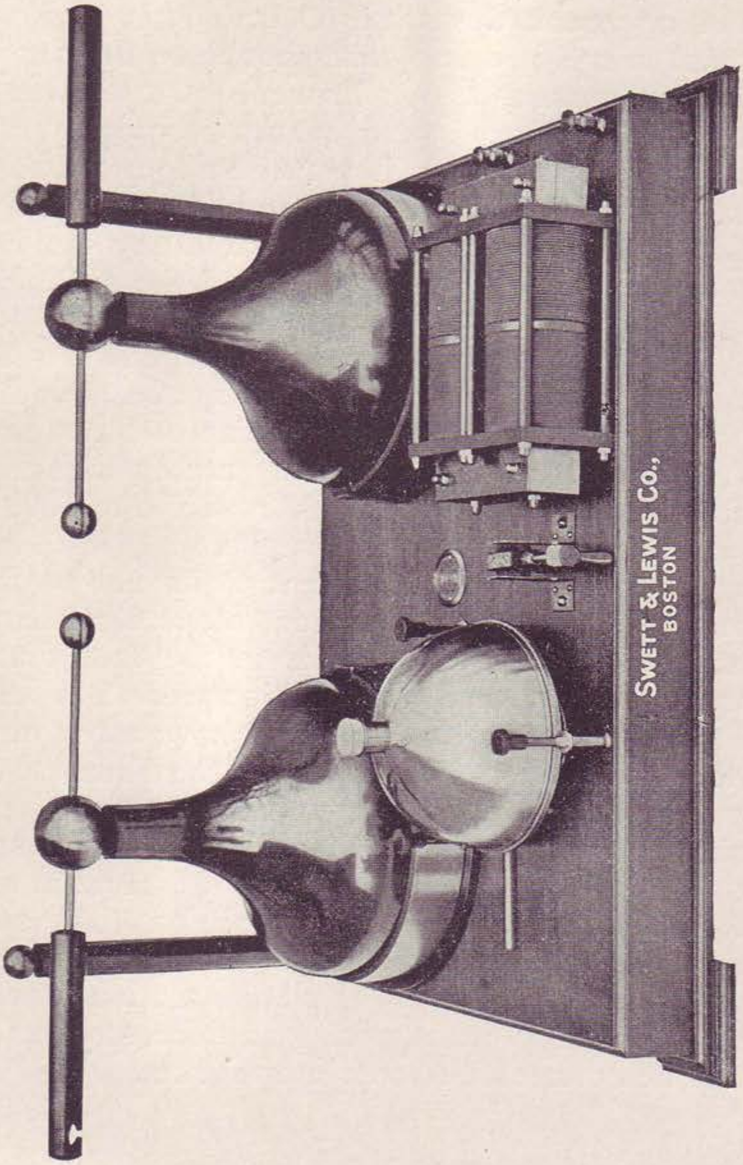
For full particulars regarding the construction of the Coil, we would refer you to pages 3 to 9, Bulletin No. 28. This Coil is one of the simplest pieces of X-ray


SWETT & LEWIS CO.,
BOSTON

THE KINRAIDE HIGH FREQUENCY COIL, DIRECT CURRENT apparatus yet put before the medical public. It is not only simple, but light, strong and compact. Owing to the peculiar method of construction, it is impossible to burn out or break down the Coil. This is a very important feature, and one that should be fully appreciated, as a burned-out or broken-down coil is an expensive thing to repair, and cannot be quickly done. This is specially important if you are a long way from base of supplies. A radical change is made in the construction of this Coil over that of all others, inasmuch as the primary is placed outside the secondary. The lines of force in the secondary all tend inward, which places the primary beyond the range of any high potential currents, and therefore it is not possible for a spark to jump to it, thus making it impossible to break down the secondaries. The Coils are manufactured for direct currents of all voltages from 110 to 500, and for all commercial alternating circuits. There need be no fear of the alternating current Coils not working with perfect satisfaction. A great advantage that the alternating Kinraide Coil has is in the fact that no mercury or electrolitic interrupter is used. The above are all more or less troublesome and have many objectionable features. The interrupter on the Kinraide Coil is very simple, easy of adjustment and is very durable. It consists of two large copper discs controlled by a small lever. An extremely small amount of current is used, so that the cost of operation is very slight. The entire apparatus is readily portable, and can be transported without risk of breakage. Full instructions for use are furnished. No extra wiring is necessary, as the Coil may be connected to any lamp socket.

Discharge

The current delivered from the Coil is of great volume, and of extremely high voltage, making it easy


SWETT & LEWIS CO.,
BOSTON

THE KINRAIDE HIGH FREQUENCY COIL, ALTERNATING CURRENT to do the finest kind of X-ray work, both in radiography and X-ray therapy. Another great advantage is that the current generated by the Coil is of the true high frequency variety, making no further piece of apparatus necessary, as this current may be applied direct to the patient, and all of the high frequency effects produced, either by means of vacuum or other electrodes, list of which is given on pages 14 to 16.

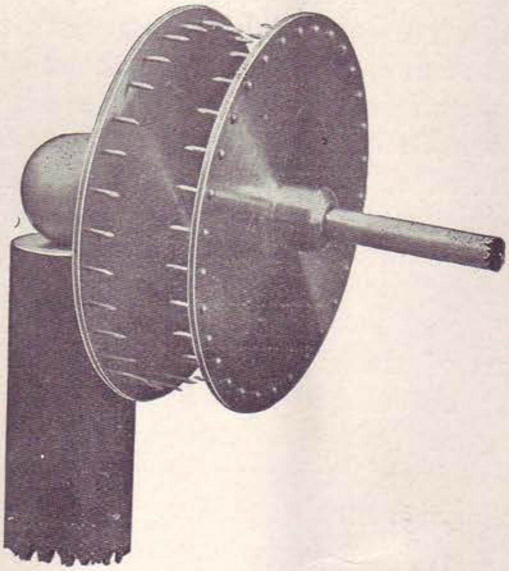
Control

By means of the rheostat, the current drawn from the Coil may be held under the absolute control of the operator, he being able to get anything from a spark about an inch long, and of very small volume, to the entire capacity of the Coil. This rheostat should be used on all Coils, and it is not only a help to the operator when using the vacuum electrodes, but it is of great assistance when manipulating X-ray tubes. The current is under the complete control of the operator at all times, and there is absolutely no danger of giving an unpleasant shock to the patient. The current delivered from the vacuum electrodes is smooth and even, and can be varied at will from the very lightest, which is entirely imperceptible to the patient, to one so strong as to produce the most violent contractions.

Points of Superiority

A few of these points are durability, reliability, simplicity, great power, low price, small cost of operation, portability, readiness for work, and the fact that it is not only a powerful X-ray generator, but also a high frequency machine as well. The combined Coil and Ultra Violet apparatus is the most compact, strongest and most powerful yet invented.

Spark Regulator for Coil



The cut shown above gives a good idea of this very useful attachment. It was designed specially for use with the Kinraide Coil, but may be used with any coil. Its special use is to introduce a resistance into the circuit with the patient or electrode, while using the high frequency electrodes. By its use the current may be regulated with great exactness.

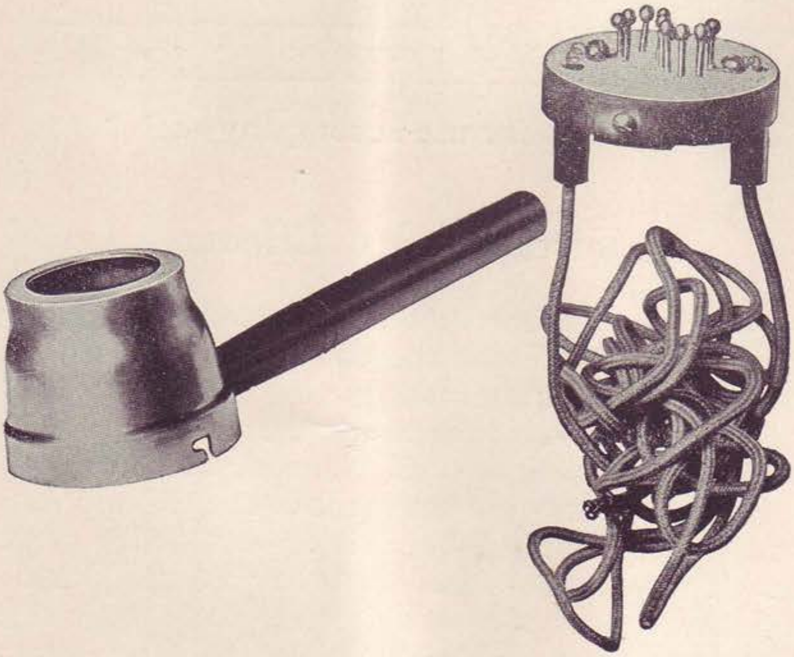
Price . . . . $4.00 per pair. Code word, Clisson

X-Ray Plates

5 x 7	$1.40 per dozen.	Code word, Einhergang
6½ x 8½	2.30 per dozen.	Code word, Einhuellen
8 x 10	3.40 per dozen.	Code word, Einimpfen
10 x 12	5.50 per dozen.	Code word, Einjæhrig
11 x 14	7.00 per dozen.	Code word, Einjagen

A supply of the above sizes always in stock. These plates are specially wrapped in light proof paper, no plate holder being required for use with the X-ray.

Spark Lamp
to Produce Ultra Violet Rays



The lamp is very simple, cannot get out of order, and may be run from a Kinraide Coil or static machine direct, without difficulty.

The base of the lamp is of slate. Cords are heavily insulated, so that there is no danger of the patient getting a shock by contact. The top is of brass, nicely nickeled. A hard rubber handle is attached so that the patient or operator may conveniently hold the lamp in position. The balls, across which the spark passes, are of iron. The lens is of the finest crystal and may be easily detached for the purpose of cleaning.

The whole lamp may be readily rendered antiseptic, as nothing but metal and crystal are brought near the patient. It is almost noiseless in its operation, and may be held against the affected part in such a manner as to produce compression. In selecting a lamp, great care should be taken, as many lamps of this character are put out with glass lenses, which are almost, if not quite, opaque to the Ultra Violet ray.

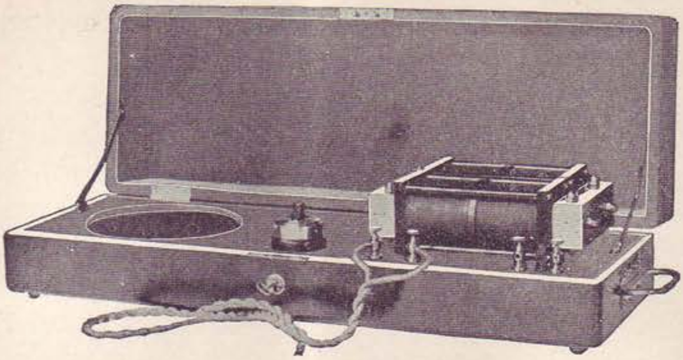
Price, complete with attaching cords, $10.00 Code word, Oggerunt

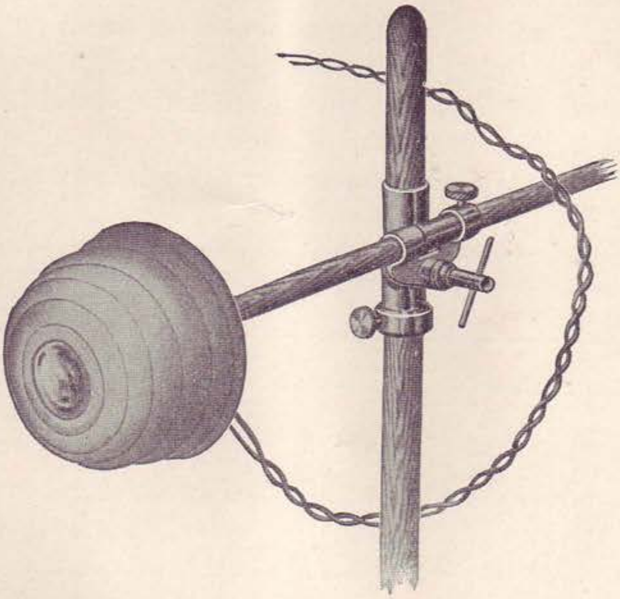
Full directions for use accompany each lamp.

Ultra Violet Effects

For more powerful effects the lamp manufactured by us, and which we call the Ultra, may be used by all who can obtain the alternating current. This wonderful piece of apparatus generates the true Ultra Violet rays with but few light rays. The lamp is, in reality, a modification of and improvement over the lamp known abroad as the "Bangs," but it is at least twice as powerful. There, it is claimed that the "Bangs" lamp has an efficiency varying from sixteen to sixty times that of the large arc lamps originally used for this purpose. In bringing out this lamp, we have placed in the hands of the physician an instrument of the highest power, and one that is fast winning a reputation for itself in this country. We have taken advantage of the fact that condenser currents of high voltage, when used in connection with iron electrodes, will produce the Ultra Violet rays with few light or heat rays.

This is really a diminutive arc lamp, entirely enclosed in a nice nickel case, and having in front a fine rock-crystal lens, which is perfectly transparent to the Ultra Violet ray. Instead of carbons, the electrodes of the lamp are of iron. They are regulated by a small thumb-screw at the back of the lamp, and are very easily adjusted. The lamp runs very quietly; with the





case removed a slight humming is heard. This lamp may be supported by any available stand. It is, however, designed with special reference to the floor stand illustrated on page 17 of this bulletin.

In connection with this stand, the lamp may be placed at any angle or height, and rotated in any direction with ease. The patient may be brought near to or touching the lens, so that the rays may be brought into direct contact with the desired area. Very little heat is generated and no cooling or coloring device is necessary. The whole case of the lamp may be readily detached and boiled for the purpose of sterilization if desired.

Few light rays are given off, but the arc is very rich in invisible Ultra Violet rays, so much so that the eyes must be protected with glasses or some opaque substance at all times when near the lamp. Tests show that this lamp produces many times the quantity of the true Ultra Violet rays generated by any other lamp on the market, not excepting the largest arcs in use. This, too, at very small expense.

The cost of running a lamp of this sort will not exceed six to eight cents per hour at the average cost of the electric light, while a large arc lamp may cost as much as two dollars for the same time, besides necessitating special wiring and fixtures.

Twelve extra electrodes and full instructions for use go with each lamp.

Price complete, as shown in cut, with stand for supporting lamp	$110.00
Price without stand	100.00

A special stand is furnished with this lamp. The stand is of brass, very nicely finished, and allows the lamp to be held in any desired position.

Lamp now built for alternating current only.

The lamp which forms a part of this apparatus can be attached to any Kinraide Coil, run on the alternating circuit. It will, however, be necessary to send the Coil to our factory in order to have the necessary switches put on and changes made. This can be done without detriment to the working of the Coil. This lamp cannot be applied to the direct current Coils.

Ultra Lamp, connecting cord, switches, and all necessary attachments fitted to any alternating current Kinraide Coil, new or old, for	$50.00

Freight or express charges to be paid by owner of Coil.

For the Coil and Ultra combination, prefix the letter U to the Code Word for the coil of proper voltage and cycle. Thus: UKoperig, meaning a Kinraide Coil and Ultra combined and designed to run on a circuit of 52 volts and 7200 alternations.

Price List

COILS

The Kinraide Induction Coil	$130.00
(Direct and alternating currents of all voltages from 110 to 250)	
500-Volt Coils, extra	20.00
Alternating Current Coil and Ultra combined . . .	175.00

CODE WORDS

52 volts, 7,200 Alternations	Koperig
104 volts, 7,200 Alternations	Kopernikus
110 volts, 7,200 Alternations	Koperkies
52 volts, 16,000 Alternations	Koperkleur
110 volts, 16,000 Alternations	Kopermolen
110 volts, 15,000 Alternations	Kopermunt
110 volts, Direct Current	Intardatum
220 volts, Direct Current	Intardetis
235 volts, Direct Current	Intarlando
250 volts, Direct Current	Intarlare
500 volts, Direct Current	Intarlato

TUBES

K Tube for Direct Current Coil (code word, Delustro) . . .	$12.00
H Tube for Alternating Current Coil only (code word, Delusively)	14.00
Insulating Cords, for connecting Tubes, per set	1.00

An allowance, towards the price of new apparatus, will be made for the return of the complete terminals of either of the above tubes. See page 9.

FLUOROSCOPES

Platinum Barium Cyanide Fluoroscope, 4 x 5 (code word, Eapse)	$ 8.00
Platinum Barium Cyanide Fluoroscope, 5 x 5 (code word, Earinus)	10.00
Platinum Barium Cyanide Fluoroscope, 5 x 7 (code word, Earshrift)	12.50
Platinum Barium Cyanide Fluoroscope, 6 x 6 (code word, Earthiness)	13.00
Platinum Barium Cyanide Fluoroscope, 6 x 8 (code word, Earthling)	16.00
Platinum Barium Cyanide Fluoroscope, 8 x 10 (code word, Earthly)	24.00

FLOOR TUBE STAND

Floor Tube Stand, with Adjustable Spark Gap (code word, Finados)	$10.00

TABLE

A Finely Polished Quartered Oak Table large enough for either of the foregoing outfits, and equipped with ball-bearing castors (code word, Firmandos)	12.00

RHEOSTAT

Rheostat	8.00

BLOCK TIN

Block Tin for X-Ray Shields (code word, Blemmyer) per lb.	.25

This material comes fifteen inches wide and a strip three feet long makes a pound.

In using code words for outfits prefix the code word denoting voltage, etc., of coil. See page 29.

OUTFIT NUMBER THIRTY-THREE

(Code word, Unpublic)

For Direct Current:		
One Direct Current Kinraide Coil	$130.00	
Two Tubes, Type K	24.00	
One 5 x 7 Platinum Barium Cyanide Fluoroscope	12.50	
One Floor Tube Stand	10.00	
One Rheostat	8.00	
		$184.50

OUTFIT NUMBER THIRTY-FOUR

(Code word, Vestifluam)

For Alternating Current:		
One Alternating Current Kinraide Coil	$130.00	
Two Tubes, Type H	28.00	
One 5 x 7 Platinum Barium Cyanide Fluoroscope	12.50	
One Floor Tube Stand	10.00	
One Rheostat	8.00	
		$188.50

OUTFIT NUMBER THIRTY-FIVE

(Code word, Unpunished)

For Direct Current:		
One Direct Current Kinraide Coil	$130.00	
Two Tubes, Type K	24.00	
One 6 x 8 Platinum Barium Cyanide Fluoroscope	16.00	
One Rheostat	8.00	
One Floor Tube Stand	10.00	
Four pounds of Block Tin	1.00	
One pair of Spark Regulators	4.00	
One set of six Vacuum Electrodes	5.00	
		$198.00

OUTFIT NUMBER THIRTY-SIX

(Code word, Vestigabas)

For Alternating Current:		
One Alternating Current Kinraide Coil	$130.00	
Two Tubes, Type H	28.00	
One 6 x 8 Platinum Barium Cyanide Fluoroscope	16.00	
One Rheostat	8.00	
One Floor Tube Stand	10.00	
Four pounds of Block Tin	1.00	
One pair of Spark Regulators	4.00	
One set of six Vacuum Electrodes	5.00	
		$202.00

OUTFIT NUMBER THIRTY-SEVEN

(Code word, Timindos)

For Alternating Current:		
One Alternating Current Kinraide Coil and Ultra Violet Apparatus combined	$175.00	
Two Tubes, Type H	28.00	
One 5 x 7 Platinum Barium Cyanide Fluoroscope	12.50	
One Floor Tube Stand	10.00	
One Rheostat	8.00	
		$233.50

OUTFIT NUMBER THIRTY-EIGHT

(Code word, Tronconner)

For Direct Current:		
One 500 Volt Kinraide Coil	$150.00	
Two Tubes, Type K	24.00	
One 5 x 7 Platinum Barium Cyanide Fluoroscope	12.50	
One Floor Tube Stand	10.00	
One Rheostat	15.00	
		$211.50

OUTFIT NUMBER THIRTY-NINE

(Code word, Timenoguy)

For Alternating Current:

One Alternating Current Kinraide Coil and Ultra Violet Apparatus combined	$175.00	
Two Tubes, Type H	28.00	
One 6 x 8 Platinum Barium Cyanide Fluoroscope	16.00	
One Floor Tube Stand	10.00	
One Rheostat	8.00	
One Quartered Oak Table	12.00	
One pair of Spark Regulators	4.00	
One set of Vacuum Electrodes	5.00	
		$258.00

OUTFIT NUMBER FORTY

(Code word, Timeous)

One Alternating Current Kinraide Coil and Ultra Violet Apparatus built on a fine cabinet	$225.00	
Two Type H Tubes	28.00	
One 6 x 8 Platinum Fluoroscope	16.00	
One Floor Tube Stand	10.00	
One Rheostat	8.00	
One set of ten Electrodes all glass	20.00	
		$307.00
Without Ultra Violet Attachments (code word, Timeously)		$262.00

OUTFIT NUMBER FORTY-ONE

(Code word, Unpurged)

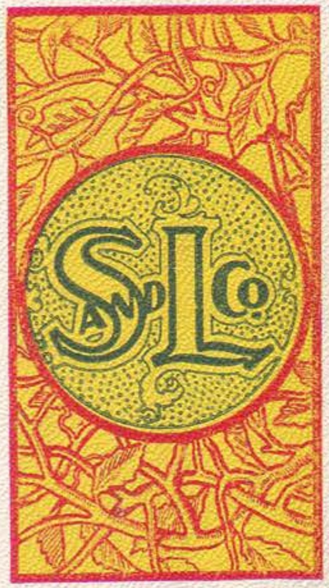
One Direct Current Kinraide Coil built on a fine cabinet	$180.00	
Two Type K Tubes	24.00	
One Floor Tube Stand	10.00	
One 6 x 8 Platinum Fluoroscope	16.00	
One Rheostat	8.00	
One set of ten Electrodes all glass	20.00	
		$258.00

The Cabinet used in above outfits is of quartered oak, finely finished, its top forming the base for the coil, which cannot be removed.

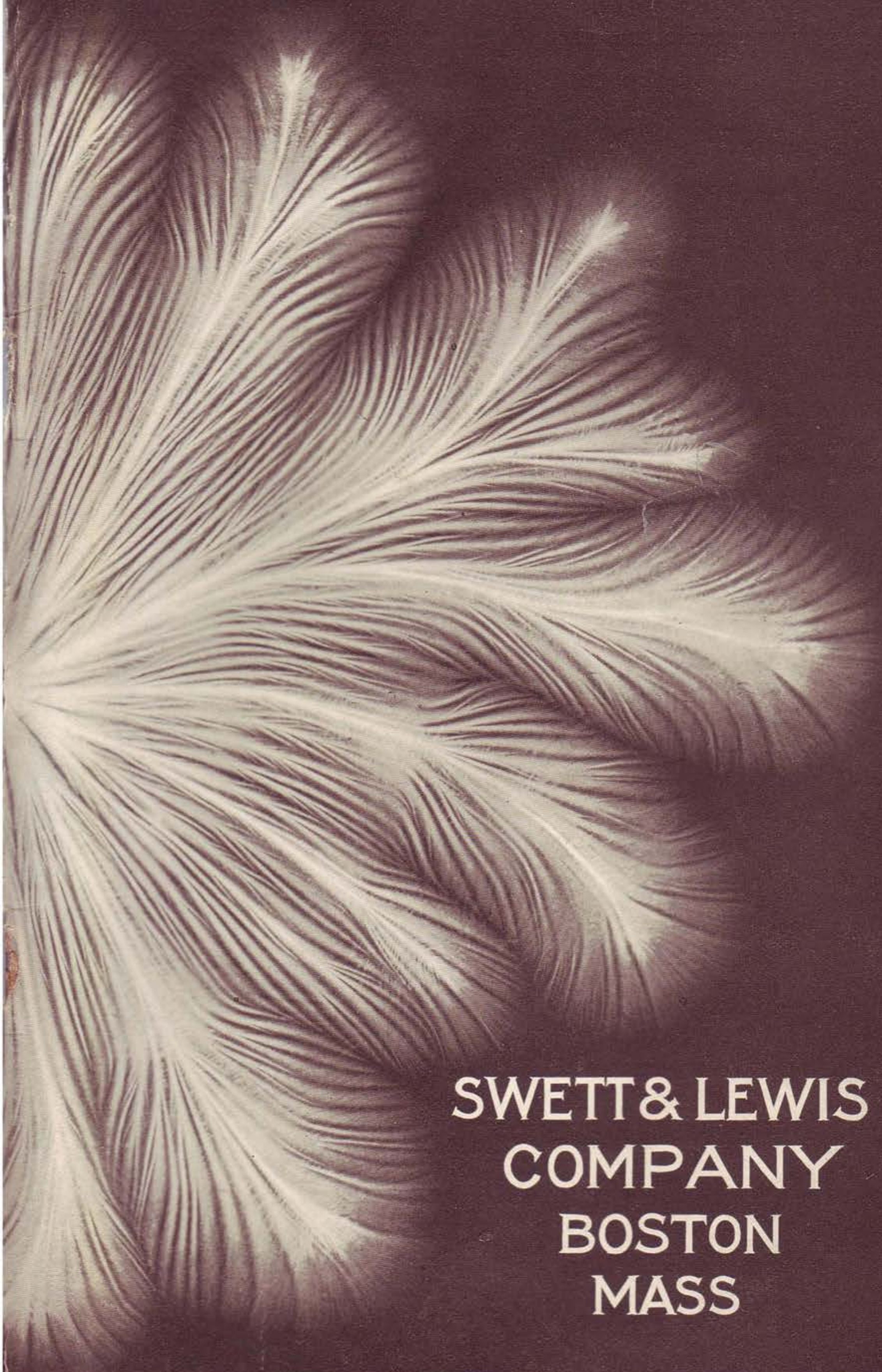
Drawers are furnished to hold tubes, electrodes, and supplies.

The whole is mounted on large rubber-covered rollers.

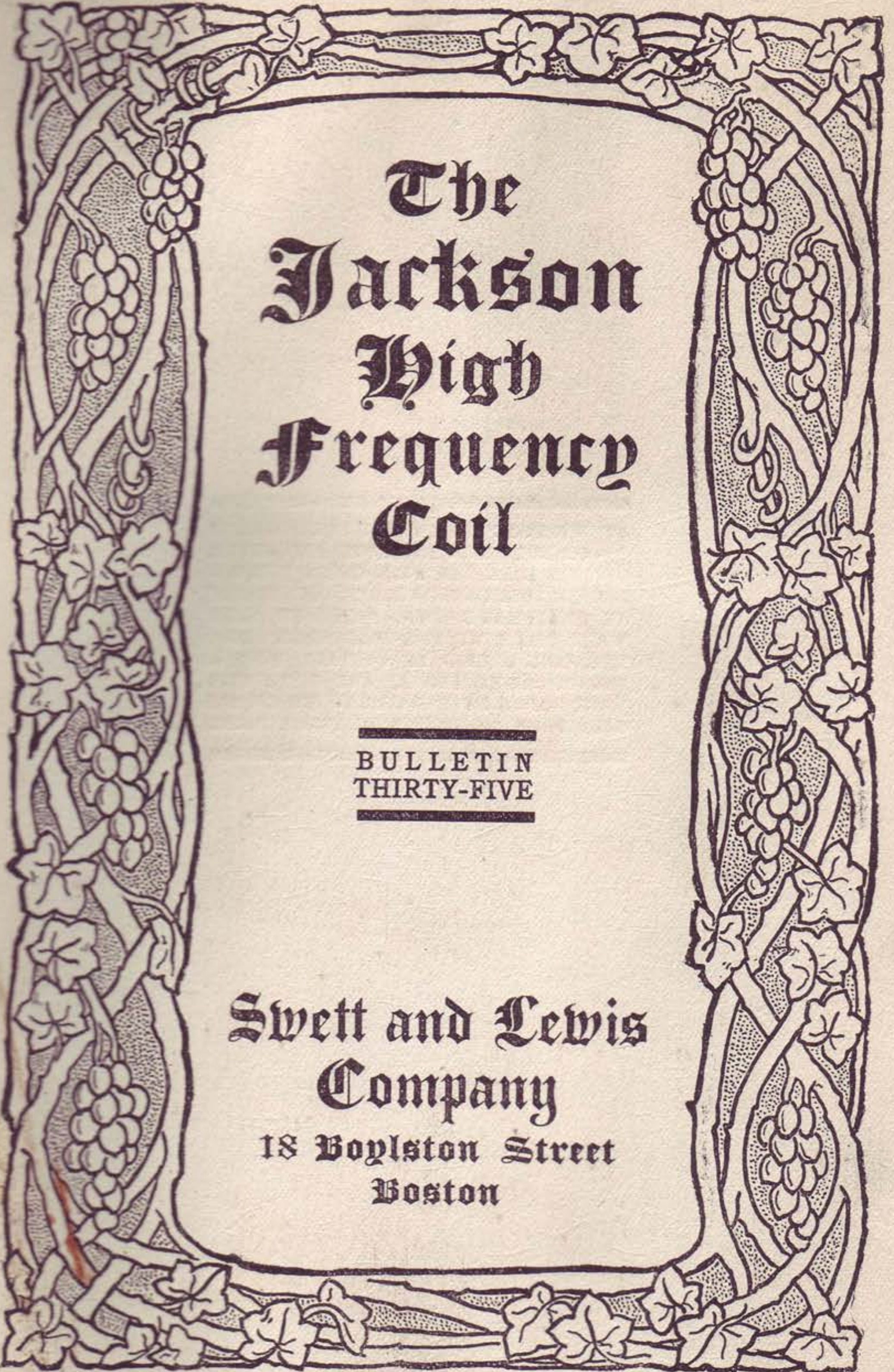
This makes a very fine and impressive instrument, and is an ornament to any office.



PRESS OF
MOREY
AND
EMERY
COMPANY



SWETT & LEWIS COMPANY
BOSTON
MASS

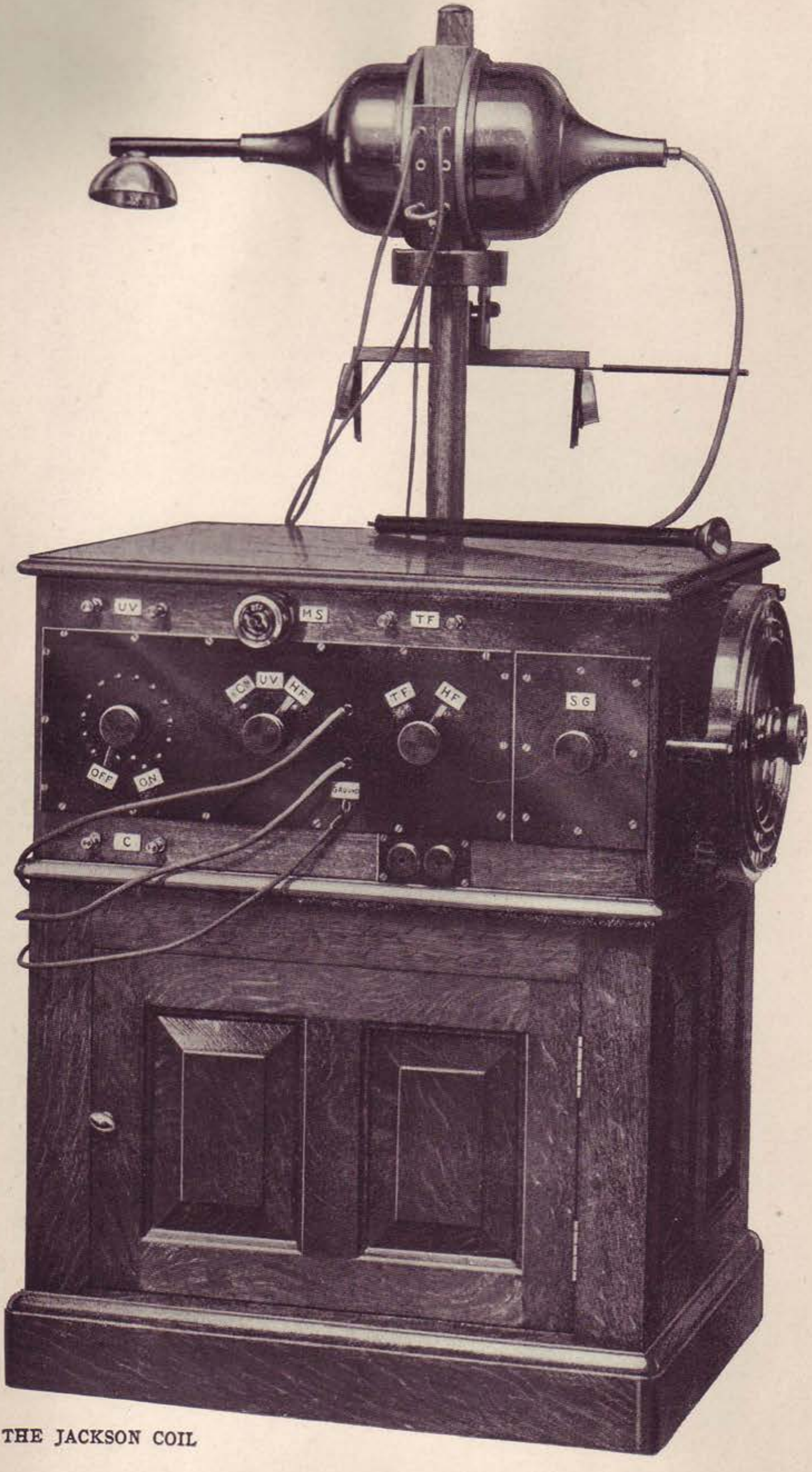


The Jackson High Frequency Coil

BULLETIN
THIRTY-FIVE

Swett and Lewis
Company
18 Boylston Street
Boston

¶ WE HOPE THAT THE UNIQUE DESIGNS ON BOTH THE ENVELOPE AND COVER OF THIS BULLETIN WILL CAUSE THE OBSERVER TO INVESTIGATE THE COIL WHOSE AUTOGRAPH IS SHOWN. THESE PICTURES WERE MADE BY THE DISCHARGE FROM THE COIL COMING IN CONTACT WITH A PHOTOGRAPHIC PLATE, AND SHOW THE WIDE RANGE OF THE COIL TO WHICH WE CALL YOUR ATTENTION IN THESE PAGES


UV
MS
TF
UV
HF
TF
HF
SG
OFF
ON
C
GROUND

THE JACKSON COIL

BULLETIN THIRTY-FIVE

The Jackson Coil

TO meet the demand for a High Frequency Coil from which the breeze current, similar to that from a Static, can be obtained, this Coil has been devised. It is the result of several years' experimental work on the part of the inventors, Messrs. Kinraide and Jackson, and is a development of the well-known Kinraide Coil, and much superior to it.

¶ The Jackson Coil has no moving parts and the primary current is not interrupted. The fact of not having to deal with a complicated, dirty interrupter that always needs tinkering and petting will be appreciated by the busy physician. No interrupter has yet been made that will successfully handle currents of voltages commonly used in lighting service, without annoyance. Some possess one bad feature and some another, but those who have used several interrupters will agree that there are serious drawbacks to every one, and the expense of maintenance is not to be disregarded. It is a disagreeable task to clean an interrupter using mercury or acid, and even the replacing of platinum points is a serious expense. In this Coil there is nothing to wear out or over-heat, and when adjusted to give a certain current it will run for hours without any variation or attention whatever. As shown in the illustration, the apparatus is enclosed in a very handsome quartered oak cabinet resting on the floor, finished on all four sides, which makes it an ornament to any office. The top of the cabinet is perfectly plain. The switches and regulating devices are placed where they will be readily accessible, and everything is so constructed that no metal parts whatever project from the cabinet, making it impossible to receive an accidental shock. There is no delicate mechanism exposed. The Coil can easily be kept in the very best shape with a minimum amount of labor. All

"You certainly have gotten several laps ahead of every other maker of coils in your new spark gap, which does work beautifully."

the working parts of the coil proper are in the upper part of the cabinet, the top of which can readily be removed.

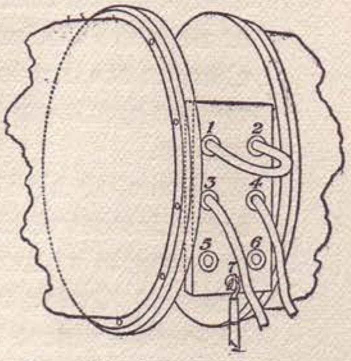
¶ The Coil is designed to run on an alternating circuit, and when a direct current only is available, a rotary converter is placed in the base of the cabinet and controlled from the outside. The converter is of the best design, of ample proportions, and capable of running for hours without attention, so that the apparatus is equally efficient on either circuit. When the Coil is run on the alternating service, the lower part of the cabinet is not needed, and may be used for the storage of tubes and other paraphernalia. If the direct current should be given in the daytime and alternating at night, or vice versa, a small switch would enable the Coil to be run at all times.

¶ A new feature of this Coil is the spark gap, which is the fundamental part of every high frequency or oscillating system. This has been developed on an entirely new plan and does not need any attention whatever. It is entirely out of sight and does not annoy the operator by light or noise, as in some forms of apparatus. It is placed in a small drawer or slide, so that it is instantly accessible, and cannot be replaced in any but the right way. It is the result of patient research and countless experiments, that were discontinued only after it was deemed certain that no further improvement could possibly be made. It is easily adjustable and the sparks flow across with absolute steadiness in any position. An entirely new method of cooling the electrodes is used, which is perfect in its action and requires no water or other outside aid. The sparking takes place between two prisms of ample length, which will last during months of continuous hard work. Each prism has four edges which may be used, and it is but the work of a moment to change them or put in new ones, which cost but little.

"The regulation for both X-Ray and high frequency is perfect."

¶ The transformer used is of ample size to deliver a large current at a very high voltage, and is capable of standing the entire current direct from the street. A rheostat is used for purposes of regulation only. The condenser is simple, reliable, and will give no trouble.

¶ In view of the fact that currents of extreme high frequency and voltage cannot be transmitted through even a heavily insulated conductor for a few feet without great loss, it has been deemed advisable to bring the final transformer, in the form of a pair of secondaries, close to the patient, instead of attempting to bring the patient up to the cabinet. These secondaries are mounted upon an attractive floor stand so that they may be readily adjusted at any convenient height, and are connected by means of a flexible cable to the cabinet. In the illustration of the Coil, this stand is shown directly behind the cabinet. The base is large and heavy enough to preclude the possibility of being over-balanced. By this arrangement, a very high frequency current of great volume may be delivered to the person of the patient with small loss. The current required to excite these secondaries is of such a character as to flow readily through a cable of moderate length, which can be handled with perfect safety, even when delivering the full output. A unique tube holder, capable of every adjustment, may be attached to the secondary stand at will, making an unexcelled device for X-Ray work. The tube holder may, when not in use, be turned down out of the way, as shown in the cut.

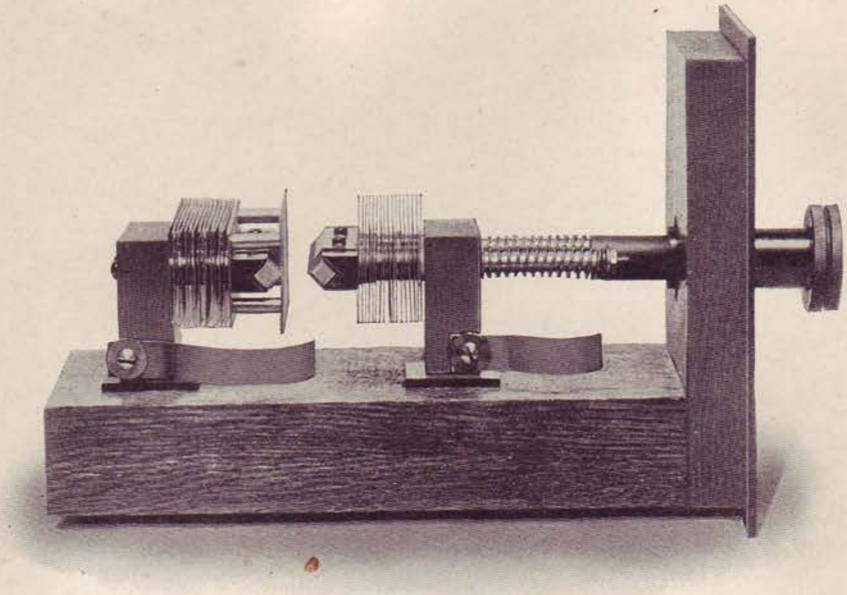


¶ The secondaries proper are of the same design as those in the Kinraide Coil, a thin disc of fine wire embedded in an insulating compound and placed inside of a protecting case. This arrangement, with a ground wire, gives perfect protection from a breakdown or an accident. The full discharge can be grounded with no strain on the insulation, and the ground between the two secondaries does not diminish or interfere with the application of both secondaries to the patient. The multiple primaries in each of the secondaries are a new feature. These primaries are so arranged that, by means of a very simple switching device, three different combinations of primary are obtained as applied to each secondary coil, so that either secondary may be used independently or both together with any combination; thus giving a variety of effects with one instrument — never before approached — combined with the utmost simplicity. The current of the highest frequency is obtained from the primary of the fewest turns, combined with the shortest length of the spark gap. All of these combinations can be varied at will by means of a rheostat of fifty steps and the latest pattern, so that infinite delicacy of adjustment may be obtained. The current consumption of the Coil is small. Unlike most pieces of apparatus which take but a small amount of current to excite, the quantity of high frequency current generated is large, and the apparatus is of a high degree of efficiency.

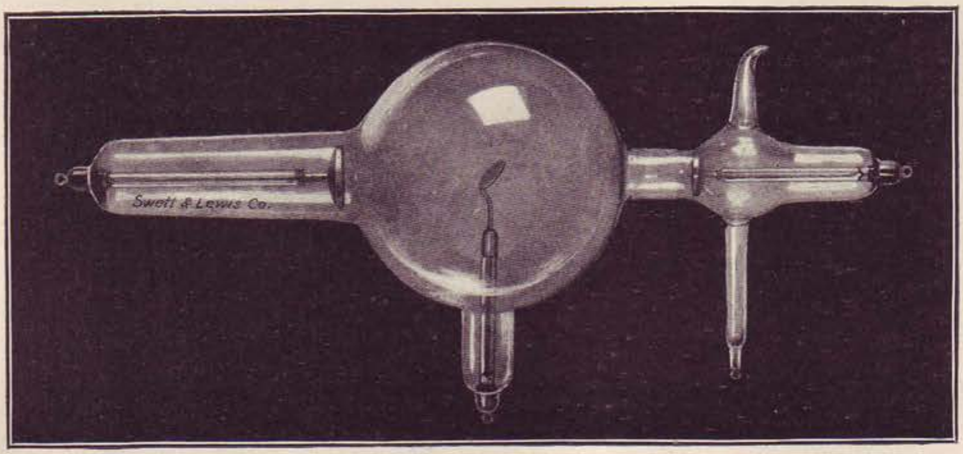
¶ This Coil may be so manipulated as to produce a surprising variety in the discharge. A soft blue breeze can be obtained of long, feathery, fern-like, positive discharge, which will be given off in every direction. These are soft and attractive in appearance. Fierce spark rays may be generated, interspersed with pink, snaky flames. At times, the discharge from the secondary may be entirely positive and can be readily recognized. At other times, a purely negative discharge is given from the ball, each point of discharge being surmounted by a positive discharge drawn in from the surrounding air. The effects of positive or negative discharge produce quite a different sensation. These changes are due to the various frequencies readily obtained by the unique spark gap and possible with no other type of apparatus known.

¶ Users of high frequency apparatus have demonstrated that some diseases yield more readily to currents of low frequency, some to currents of moderate, and still others to extremely high frequency. Owing to the great flexibility of this apparatus, it will be found to meet the requirements of all. The application of the current by means of vacuum electrodes is extremely easy, and the same effect can always be repeated by the same adjustments. New designs in metallic electrodes have been devised, which will give a splendid high frequency spray or spark at the end of a flexible cable. The brush discharge from the crown electrode is long and of the utmost fineness and smoothness, and of such a character that great latitude can be allowed in the treatment without accidentally sparking the patient. This point alone is of great value.

"The volume of current delivered is wonderful."



THE SPARK GAP


Swett & Lewis Co.

SPECIAL H. F. X-RAY TUBE

¶ The whole effort of the designers of this Coil has been to produce an easily manipulated apparatus, giving a wide range of effects, any one of which can be repeated at any time by the same adjustments, which are easily comprehended and remembered. Although the appearance of the cabinet is simple and convenient, yet the amount and variety of hard work that can be obtained from it at any time will put far in the background the most powerful Static machine, the large Rhumkorff Coil with its cumbersome high frequency attachment, and any Ultra Violet apparatus on the market, to say nothing of the cautery.

¶ We do not believe it is possible by any other means of construction to produce a Coil capable of giving such enormous voltages and frequencies without quickly destroying itself. The Coil has been given the most exhaustive and thorough tests, and has met every requirement imposed upon it by the most exacting.

Thermo = Faradic

¶ A unique feature, which we believe is found in this Coil only, is a Thermo-Faradic attachment; which, briefly stated, is a derived circuit from a closed coil of a certain proportion. The current is applied to the patient by means of either the well-known sponge electrodes or metallic handles, and can be widely varied by means of the spark gap and rheostat from a current markedly faradic in its characteristics and possessing great smoothness, to a current having no faradic effects and producing within the body a sensation of great heat; and that this is real heat locally generated is demonstrated by actual heating of the sponges, and by the sensations of the patient. If the metal electrodes from this circuit are brought in close proximity to each other, a small but brilliant arc is produced of such intense heat that actual welding of copper (on a small scale) may be made possible. If two strips of metal are attached to this Coil and are placed in a little water, it will soon become very hot. By placing both of the electrodes on or near the diseased area, the effect will be strictly local; or by separation,

"I am using the Thermo Faradic currents with good results in cases of neuralgia."

widely diffused. Sufficient current may be taken in this manner without discomfort to bring to full brilliancy a sixteen candle power lamp, when placed in the same circuit with the patient. These currents are of true high frequency, oscillating millions of times per second.

Ultra Violet Effects

¶ Owing to the peculiar construction of the Coil, it is possible to produce powerful Ultra Violet effects. To do this, a special switch is put on the front of the cabinet, together with a pair of binding posts, and a lamp similar to the one furnished with the alternating current Kinraide Coil or the "Ultra" may be attached. This is an iron condenser arc and is fully described on pages 26, 27 and 28 of Bulletin 33. Ultra Violet rays are generated in great profusion, almost to the exclusion of all light rays. The lamp should be used in connection with a quartz compressor. For prices, see page 10.

Cautery Effects

¶ A powerful cautery transformer may be incorporated in the cabinet at a slight additional cost. The transformer gives a very large quantity of current at so low a voltage that diagnostic lamps or cautery knives may be used with perfect safety. The control is perfect and the graduations are fine. This transformer is entirely separate from and has no connection with the high frequency Coil, and there is absolutely no chance of getting a high voltage through it.

"The Static spray not affected by dampness is what we have been looking for."

X-Ray Tubes

¶ This tube was designed specially for this Coil, and is a modification of the old Type H, used with the Kinraide Coil, and combined with the valve tube so called. The reversed waves are choked back so that the hemispherical effect so familiar to Static users is produced. This tube should be a general favorite, as it is capable of very hard usage. It is recommended for all coils giving an alternating current. The tube is strongly built, the bulb of good size, and the terminals are well supported, so that they will not break down either in use or during transportation.

¶ We have no hesitation in saying that there is no apparatus more flexible or under more perfect control for operating an X-Ray tube, or for high frequency work. A Geissler tube can be excited so that it will glow to any degree of brilliancy, and this light will remain absolutely steady as long as required The Coil will deliver such an amount of current as to be beyond the capacity of most X-Ray tubes, or so little that the smallest tube can be made to barely glow. In X-Ray practice, by means of the spark gap alone, the bones of the hand may be seen as almost transparent, or the whole hand itself may be made black, and this without change of vacuum in the tube.

¶ CODE WORDS

52 volts, 7,200 Alternations	Koperig
104 volts, 7,200 Alternations	Kopernikus
110 volts, 7,200 Alternations	Koperkies
52 volts, 16,000 Alternations	Koperkleur
110 volts, 16,000 Alternations	Kopermolen
110 volts, 15,000 Alternations	Kopermunt
110 volts, Direct Current	Intardatum
220 volts, Direct Current	Intardetis
235 volts, Direct Current	Intarlando
250 volts, Direct Current	Intarlare
500 volts, Direct Current	Intarlato

Guarantee

¶ With each Coil furnished, a guarantee will be given against any defect in workmanship or material, or against burn-out not caused by improper usage, for one year from date of shipment.

"My last spark gap was always out of order. Have had no trouble with your pattern."

Price List

JACKSON HIGH FREQUENCY COIL, to run on any alternating current from 52 to 250 volts and any commercial cycle, complete as shown in cut, opposite page 2, including electrodes, stand and tube holder. Price, $350.00
Code word, Heidengeld.

JACKSON HIGH FREQUENCY COIL for 110 volts direct current, as above, including motor generator . . . . Price, $420.00
Code word, Headledge.

JACKSON HIGH FREQUENCY COIL for 220 volts direct current, as above, including motor generator . . . . Price, $430.00
Code word, Heenkomen.

MOTOR GENERATOR including starting box, for 110 volts direct current, when sold without coil . . . . Price, $70.00
Code word, Hervatting.

MOTOR GENERATOR including starting box, for 220 volts direct current, when sold without coil . . . . Price, $80.00
Code word, Hervimos.

MOTOR GENERATOR including starting box, for 500 volts direct current, when sold without coil . . . . Price on application
Code word, Hervento.

CAUTERY TRANSFORMER, additional . . . . Price, $25.00
Code word, Curtelasse.

CAUTERY HANDLE with snare . . . . Price, $6.00
Code word, Curtem.

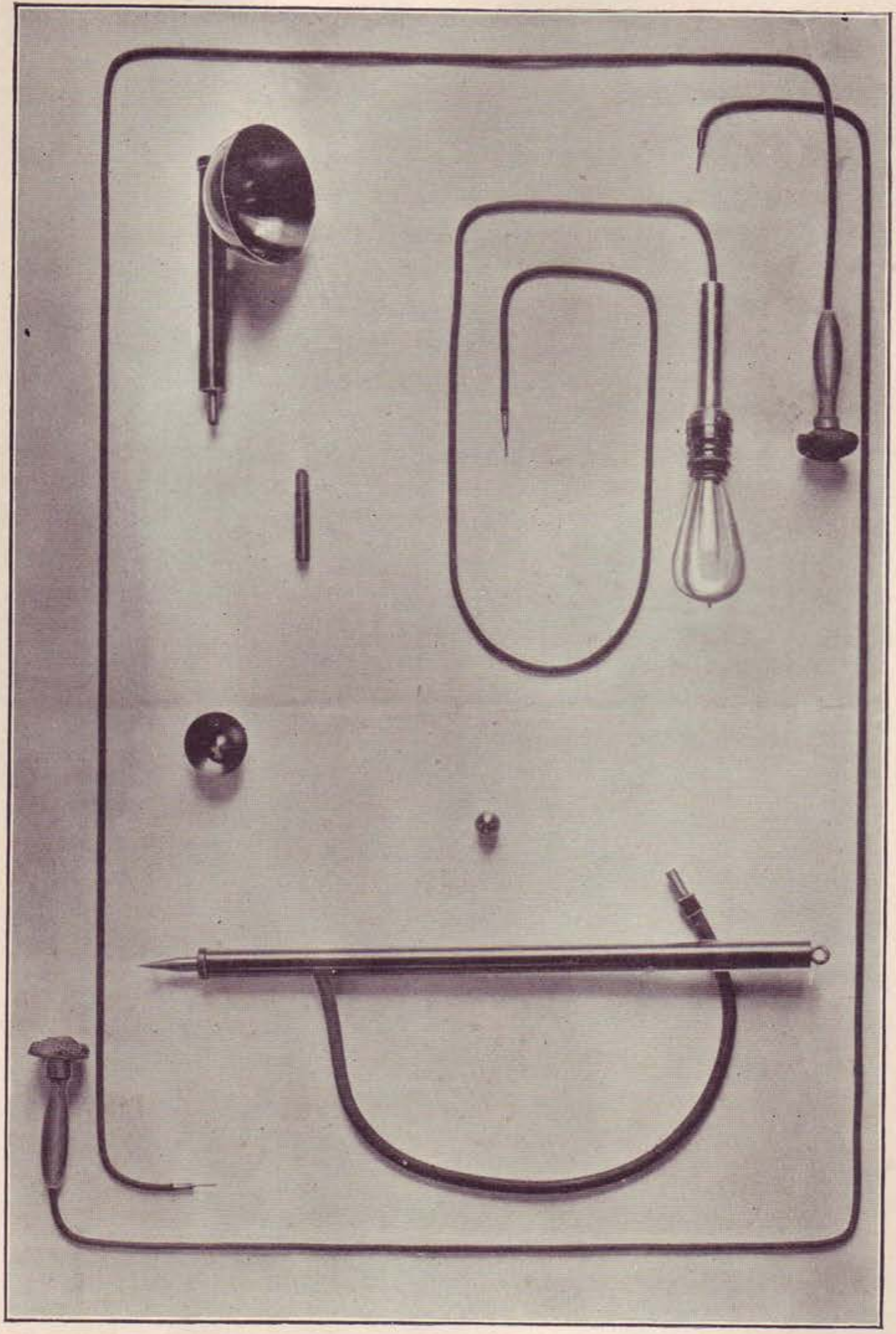
CAUTERY HANDLE, plain . . . . Price, $1.50
Code word, Curtiamos.

CAUTERY CORDS, per pair . . . . Price, $1.50
Code word, Curtidos.

CAUTERY KNIVES, No. 1 to No. 8 . . . . Price, each $0.75
See illustration opposite page 15.
Code word for set of eight, Curtilage.

"This spark gap does NOT keep getting out of order as my last one."

ULTRA VIOLET ATTACHMENT, including lamp, cable and arm for tube stand . . . . Price, $60.00
Code word, Conjunctum.



ELECTRODES

COMPRESSOR with fine quartz lens . . . . Price, $5.00
Code word, Condate.

SET OF METALLIC HIGH FREQUENCY ELECTRODES, when sold separately . . . . Price, $10.00
Code word, Hervencia.

SET OF SIX GLASS VACUUM ELECTRODES with handle, Price, $5.00
Code word, Koukarien.

SPECIAL H. F. X-RAY TUBE, as shown opposite page 6. Price, $14.00
Code word, Depor.

MINERAL TUBES, to be used as electrodes, 20 inches long, very brilliant.
Code word, Denuam. Price, each $3.00

GEISSLER ELECTRODES, No. 17 and No. 18 filled with liquid, very highly colored. Price, each $2.00. Special set of six assorted colors, Price, $10.00
Code word, No. 17, Kourgan; No. 18, Kourilien; set of six, Kozel.

WILLEMITE TUBE, small X-Ray tube with piece of willemite for anode, very handsome and brilliant . . . . Price, $6.00
Code word, Demptos.

BLOCK TIN for X-Ray shields, per pound, $0.25. A strip thirty-six inches long by fifteen inches wide makes a pound.
Code word, Blemmyer.

List of Outfits

OUTFIT NO. 60. For the alternating current.
Code word, Handlohn.

One Jackson Coil, complete, including set of metallic electrodes and tube stand	$ 350.00
One H. F. X-Ray Tube	14.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of Vacuum Electrodes with Handle	5.00
	$379.00

"Your spark gap is the right principle and does not require continual repairs."

OUTFIT NO. 61. For the 110 volts direct current.
Code word, Handlubben.

Same as enumerated in Outfit No. 60	$379.00
One Motor Generator, complete, fitted in cabinet	70.00
For 220 volts, add to above, $10.00.	$449.00

OUTFIT NO. 62. For the alternating current.
Code word, Handlung.

One Jackson Coil, complete, including set of metallic electrodes and tube stand	$350.00
Two H. F. X-Ray Tubes	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of Vacuum Electrodes with Handle	5.00
One No. 17 and one No. 18 Electrode	4.00
Four pounds Block Tin	1.00
	$398.00

OUTFIT NO. 63. For the 110 volts direct current.
Code word, Handmagd.

Same as enumerated in Outfit No. 62	$398.00
Motor Generator complete and fitted in cabinet	70.00
For 220 volts, add to above, $10.00.	$468.00

OUTFIT NO. 64. For the alternating current.
Code word, Handmaiden.

One Jackson Coil, complete, including set of metallic electrodes and tube stand	$350.00
Two H. F. X-Ray Tubes	28.00
One 6 x 8 Platinum Barium Cyanide Fluoroscope	16.00
One set of Vacuum Electrodes with Handle	5.00
One set of six No. 17 and No. 18 Electrodes	10.00
One roll of Block Tin, 10 pounds	2.50
Two Mineral Tubes	6.00
One Willemite Tube	5.00
	$422.50

"I am delighted with my new coil. Enclosed please find check."

OUTFIT NO. 65. For the 110 volts direct current.
Code word, Handmandel.

Same as enumerated in Outfit No. 64	$422.50
Motor Generator complete and fitted in cabinet	70.00
For 220 volts, add to above, $10.00.	$492.50

OUTFIT NO. 66. For the alternating current.
Code word, Handmesser.

One Jackson Coil, complete, including set of metallic electrodes and tube stand	$350.00
Two H. F. X-Ray Tubes	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of Vacuum Electrodes with Handle	5.00
One set of six No. 17 and No. 18 Electrodes	10.00
One roll of Block Tin, 10 pounds	2.50
Two Mineral Tubes	6.00
One Willemite Tube	6.00
Cautery Attachment	25.00
One Handle and Snare	6.00
Eight Cautery Knives	6.00
Ultra Violet Attachment	60.00
One Quartz Compressor	5.00
	$519.50

OUTFIT NO. 67. For the direct current.
Code word, Handmolen.

Same as enumerated in Outfit No. 66	$519.50
One Motor Generator complete fitted in cabinet	70.00
For 220 volts, add to above, $10.00.	$589.50

❡ If the Ultra Violet Attachment is desired in addition to any of the above outfits, except No. 66 and No. 67, where it is included, add $60.00, and for Cautery Transformer add $25.00, also price of handle, knives and cords as desired. See page 10.

❡ The above outfits are given as samples only, and may be changed to suit the convenience of the purchaser.

❡ In ordering, use outfit number or code word. Be sure to specify the current on which the coil is to be used, and if alternating current, the number of alternations as well as the voltage. For list of code words for the various currents, see page 9. Example: if you wish to order outfit No. 62, coil to be used on a current of 104 volts, 7200 alternations, to be shipped by express, wire as follows:—Express Handlung Kopernikus.

"The Jackson Coil is a superb piece of apparatus and I am delighted with it."

Terms

¶ Prices in this bulletin are net, except where cash accompanies order, in which case a discount of 5 per cent will be allowed.

¶ In case of C. O. D. shipments, where a draft of 25 per cent of bill accompanies order, the same discount may be taken.

¶ Remit by express or post-office money order or by New York draft. Add twenty-five cents to face of all checks, except on New York or Boston, to cover collection charges.

References

¶ Customers unknown to us must give satisfactory references, send draft with order, or we will ship C. O. D., charges for return of money to be borne by purchaser.

¶ Goods will be delivered f. o. b. freight or express, Boston, Mass. No charge for packing. Each piece of apparatus is carefully packed and no allowance will be made for loss or breakage in transit.

¶ Western Union Telegraph code used. Telegraph and cable address, "Swettxray."

¶ When in Boston, we shall be glad to have you make your headquarters at our office.

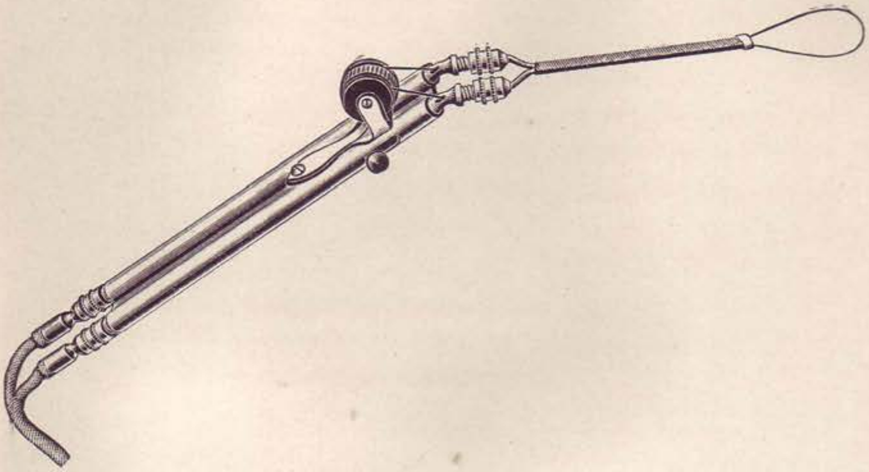
Bulletins

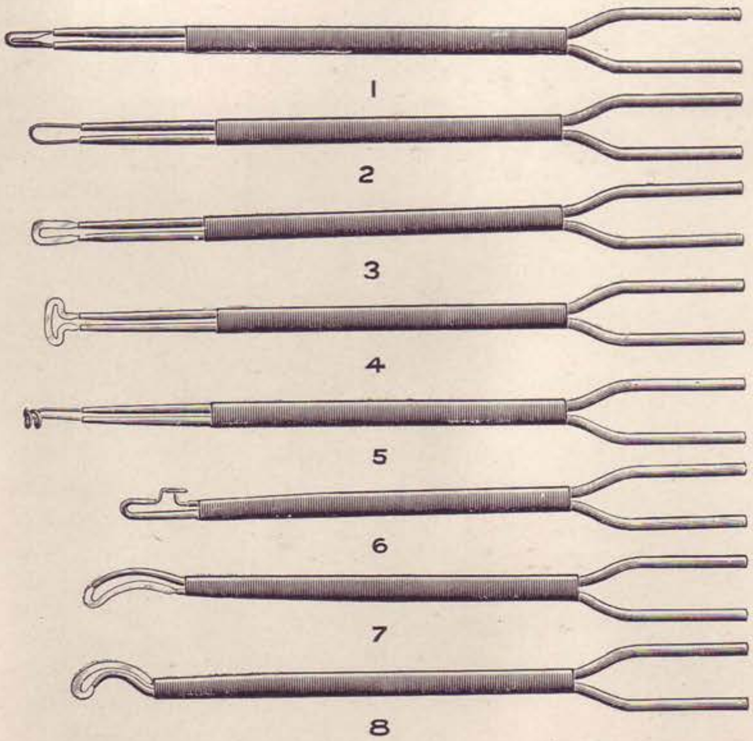
¶ We should be glad to send the following bulletins to all interested. Other bulletins are out of date.

Number Twenty-eight, Kinraide Coil and Accessories
Number Thirty, Directions for Operating Kinraide Coil
Number Thirty-two, Electrical Novelties
Number Thirty-three, Coils and X-Ray Tubes
Number Thirty-five, this one

"I consider the new Jackson Coil the most complete and satisfactory."

¶ For a good, powerful, thoroughly reliable, as well as a cheap X-Ray Coil, we heartily recommend the Kinraide for your consideration. Bulletin 33 illustrates and describes this coil as well as X-Ray tubes and supplies in general, and will be sent on request.





CAUTERY KNIVES

The Kinraide Coil

¶ For those who do not wish to invest much money but yet want a good, strong, serviceable and durable coil which will do good X-Ray work, this Coil is recommended. It delivers a high frequency current that may be used to good advantage by means of the vacuum electrodes.

¶ It may be furnished plain or with the ultra violet attachment as desired. This attachment can be used only with the alternating current coils.

¶ For full particulars concerning this Coil, see Bulletin 33.

OUTFIT NO. 52. For direct current.
Code word, Epidrome.

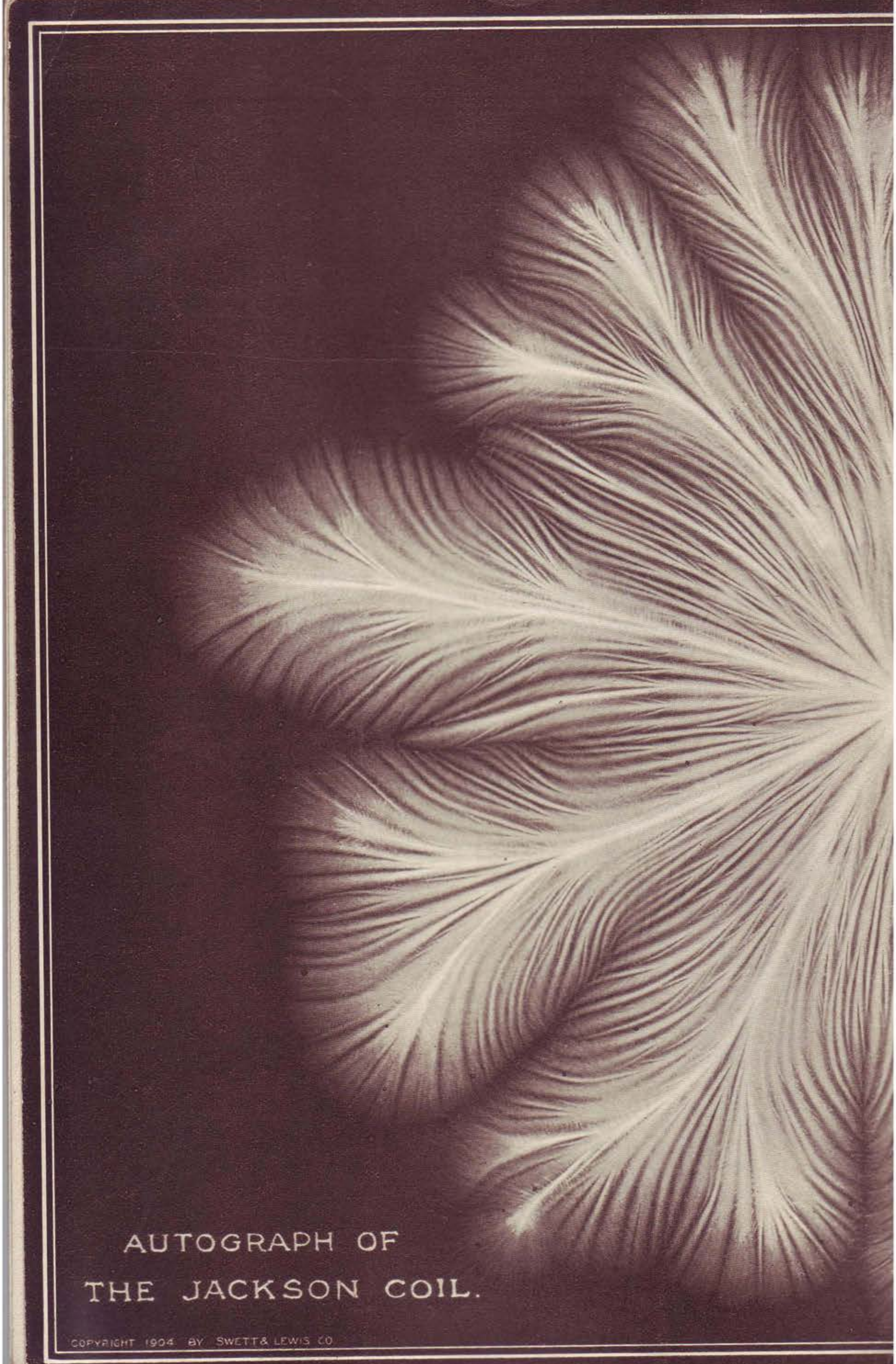
One direct current Kinraide Coil	$130.00
Two Tubes, Type K	24.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One Rheostat	8.00
One Floor Tube Stand	10.00
Four pounds of Block Tin	1.00
One pair of Spark Regulators	4.00
One set of six Vacuum Electrodes	5.00
	$192.00

OUTFIT NO. 53. For alternating current.
Code word, Epieront.

One alternating current Kinraide Coil	$130.00
Two Tubes, Type H	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One Rheostat	8.00
One Floor Tube Stand	10.00
Four pounds of Block Tin	1.00
One pair of Spark Regulators	4.00
One set of six Vacuum Electrodes	5.00
	$196.00

"My new coil is working beautifully. The effect of the spark is equal to that of a Static."

Press of Murray and
Emery Company, Boston



AUTOGRAPH OF
THE JACKSON COIL.

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THE JACKSON COIL.

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SWETT & LEWIS
COMPANY
BOSTON
MASS

Bulletin
Thirty-seven

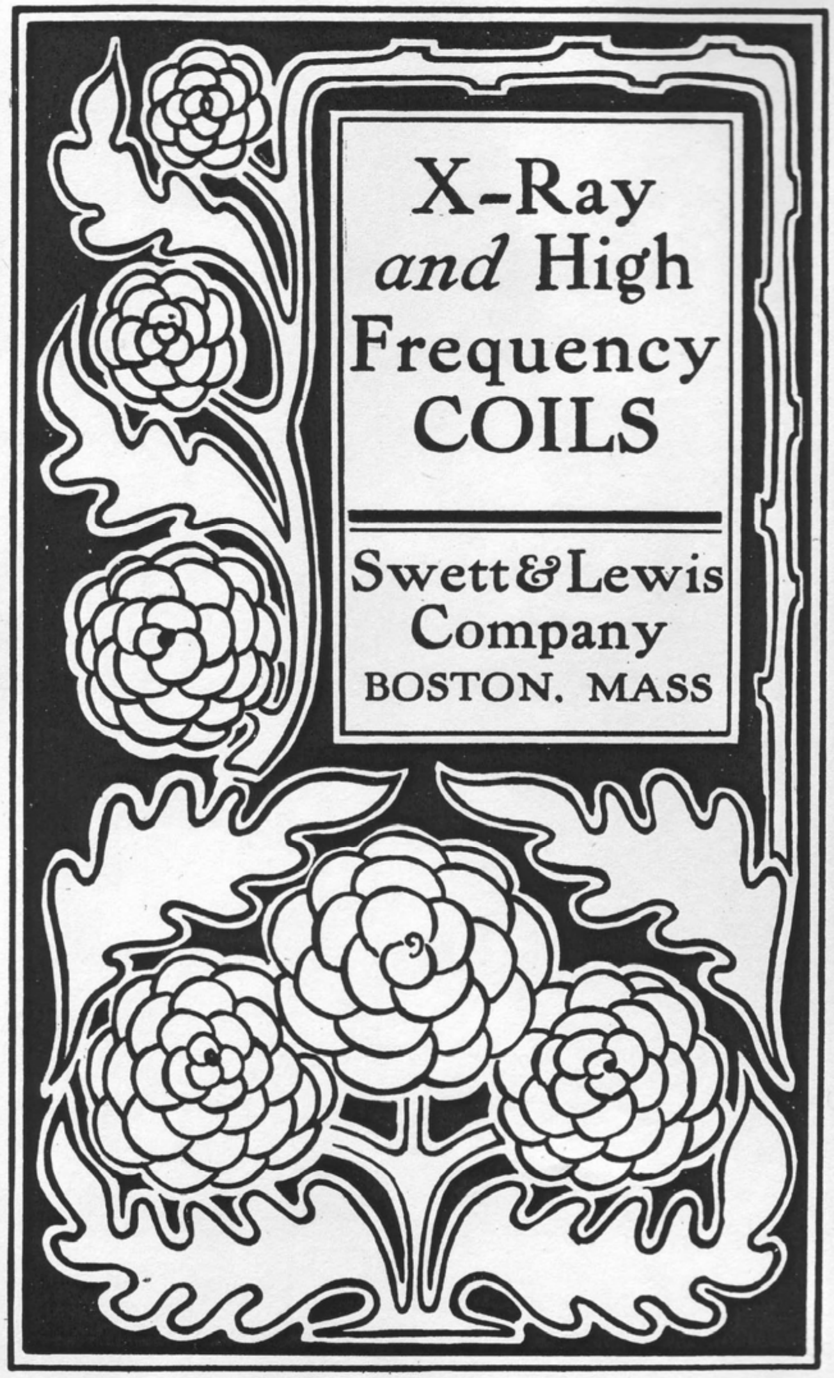
SWETT AND LEWIS
COMPANY

High Frequency Coils

18 BOYLSTON STREET
BOSTON

Bulletin
Thirty-seven

$150 -



X-Ray *and* High Frequency COILS

Swett & Lewis Company
BOSTON, MASS

The Choice of a Coil

WE REALIZE that many of our customers live at too great a distance to investigate personally the merits of each coil shown here and this is our apology for these few words. We will endeavor to give briefly the relative merits of the various coils listed herewith.

The JACKSON COIL

This is designed to take the place of a static machine, and to give the breeze discharge or effleuve with the various high frequency discharges, also X-Ray work that will be at least equal to that from a static.

The CYCLONE CABINET COIL *and* DESK COIL

These coils are designed to do heavy X-Ray work, thermo-faradic and vacuum electrode work with a minimum amount of attention. The crown breeze cannot be obtained.

The CYCLONE PORTABLE COIL

This coil was designed for bedside work and has the same power as the other two styles, with the added advantage of being portable and extremely simple.

The KINRAIDE COIL

Has been on the market so long and is so well known that it does not require further explanation than that given on pages 26 and 27.

The MILLIAMPEREMETER

Shown on page 33, should not be overlooked.

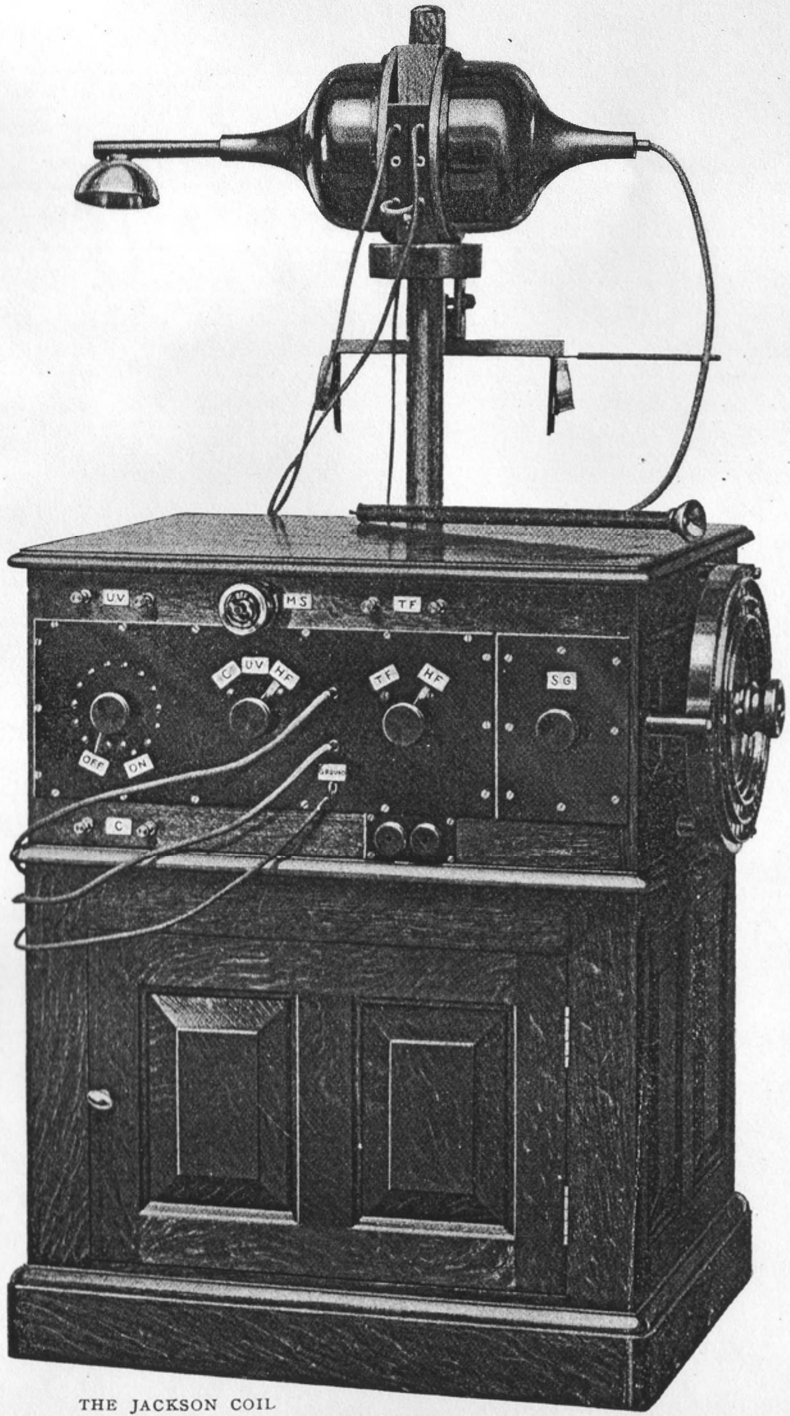
COPYRIGHT, 1905, SWETT & LEWIS COMPANY

The Jackson Coil

TO meet the demand for a High Frequency Coil from which the breeze current, similar to that from a static, can be obtained, this Coil has been devised. It is the result of several years' experimental work on the part of the inventors, Messrs. Kinraide and Jackson.

The Jackson Coil has no moving parts and the primary current is not interrupted. The fact of not having to deal with a complicated, dirty interrupter that always needs tinkering and petting will be appreciated by the busy physician. No interrupter has yet been made that will successfully handle currents of voltages commonly used in lighting service, without annoyance. Some possess one bad feature and some another, but those who have used several interrupters will agree that there are serious drawbacks to every one, and the expense of maintenance is not to be disregarded. It is a disagreeable task to clean an interrupter using mercury or acid, and even the replacing of platinum points is a serious expense. In this Coil there is nothing to wear out or overheat, and when adjusted to give a certain current it will run for hours without any variation or attention whatever. As shown in the illustration, the apparatus is enclosed in a very handsome quartered oak cabinet resting on the floor, finished on all four sides, which makes it an ornament to any office. The top of the cabinet is perfectly plain. The switches and regulating devices are placed where they will be readily accessible, and everything is so constructed that no metal parts whatever project from the cabinet, making it impossible to receive an accidental shock. There is no delicate mechanism exposed. The Coil can easily be kept in the very best shape with a minimum amount of labor. All the working parts of the coil proper are in the upper part of the cabinet, the top of which can readily be removed.

The Coil is designed to run on an alternating circuit, and when a direct current only is available, a rotary converter is placed in the base of the cabinet and controlled from the outside. The converter is of the best design, of ample proportions, and capable of running for hours without attention, so that the apparatus is equally



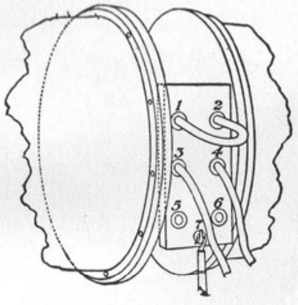
THE JACKSON COIL

efficient on either circuit. When the Coil is run on the alternating service, the lower part of the cabinet is not needed, and may be used for the storage of tubes and other paraphernalia. If the direct current should be given in the daytime and alternating at night, or vice versa, a small switch would enable the Coil to be run at all times.

A new feature of the Jackson Coil is the spark gap (see cut), which is the fundamental part of every high frequency or oscillating system. This has been developed on an entirely new plan and does not need any attention whatever. It is entirely out of sight and does not annoy the operator by light or noise, as in some forms of apparatus. It is placed in a small drawer or slide, so that it is instantly accessible, and if removed cannot be replaced in any but the right way. It is the result of patient research and countless experiments, that were discontinued only after it was deemed certain that no further improvement could possibly be made. It is easily adjustable and the sparks flow across with absolute steadiness in any position. An entirely new method of cooling the electrodes is used, which is perfect in its action and requires no water or other outside aid. The sparking takes place between two prisms of ample length, which will last during months of continuous hard work. Each prism has four edges which may be used, and it is but the work of a moment to change them or put in new ones, which cost but little.

The transformer used is of ample size to deliver a large current at a very high voltage, and is capable of standing the entire current direct from the street. A rheostat is used for purposes of regulation only. The condenser is simple, reliable, and will give no trouble.

In view of the fact that currents of extreme high frequency and voltage cannot be transmitted through even a heavily insulated conductor for a few feet without great loss, it has been deemed advisable to bring the final transformer, in the form of a pair of secondaries, close to the patient, instead of attempting to bring the patient up to the cabinet. These secondaries are mounted upon an attractive floor stand so that they may be readily adjusted at any convenient height, and are connected by means of a flexible cable to the cabinet. In the illustration of the Coil, this stand is shown directly behind the cabinet. The base is large and heavy enough to preclude the possibility of being overbalanced. By this arrangement, a very high frequency current of great volume may be delivered to the person of the patient with small loss. The current required to excite these secondaries is of such a character as to flow readily through a cable of moderate length, which can be handled with perfect safety, even when delivering the full output. A unique tube holder, capable of every adjustment, may be attached to the secondary stand at will, making an unexcelled device for X-Ray work. The tube holder may, when not in use, be turned down out of the way, as shown in the cut of the coil.



The secondaries proper are of the same design as those in the Kinraide Coil, a thin disc of fine wire embedded in an insulating compound and placed inside of a protecting case. This arrangement, with a ground wire, gives perfect protection from a breakdown or an accident. The full discharge can be grounded with no strain on the insulation, and the ground between the two secondaries does not diminish or interfere with the application of both secondaries to the patient. The multiple primaries in each of the secondaries are a new feature. These primaries are so arranged that, by means of a very simple switching device, three different combinations of primary are obtained as applied to each secondary coil, so that either secondary may be used independently or both together with any combination; thus giving a variety of effects with one instrument — never before approached — combined with the utmost simplicity. The current of the highest frequency is obtained from the primary of the fewest turns, combined with the shortest length of the spark gap. All of these combinations can be varied at will by means of a rheostat of fifty steps and the latest pattern, so that infinite delicacy of adjustment may be obtained. The current consumption of the Coil is small. Unlike most pieces of apparatus which take but a small amount of current to excite, the quantity of high frequency current generated is large, and the apparatus is of a high degree of efficiency.

This Coil may be so manipulated as to produce a surprising variety in the discharge. A soft blue breeze can be obtained of long, feathery, fern-like, positive discharge, which will be given off in every direction. These are soft and attractive in appearance. Fierce spark rays may be generated, interspersed with pink, snaky flames. At times, the discharge from the secondary may be entirely positive and can be readily recognized. At other times, a purely negative discharge is given from the ball, each point of discharge being surmounted by a positive discharge drawn in from the surrounding air. The effects of positive or negative discharge produce quite different sensations. These changes are due to the various frequencies readily obtained by the unique spark gap and possible with no other type of apparatus known.

Users of high frequency apparatus have demonstrated that some diseases yield more readily to currents of low frequency, some to currents of moderate, and still others to extremely high frequency. Owing to the great flexibility of this apparatus, it will be found to meet the requirements of all. The application of the current by means of vacuum electrodes is extremely easy, and the same effect can always be repeated by the same adjustments. New designs in metallic electrodes have been devised, which will give a splendid high frequency spray or spark at the end of a flexible cable. The brush discharge from the crown electrode is long and of the utmost fineness and smoothness, and of such a character that great latitude can be allowed in the treatment without accidentally sparking the patient. This point alone is of great value.

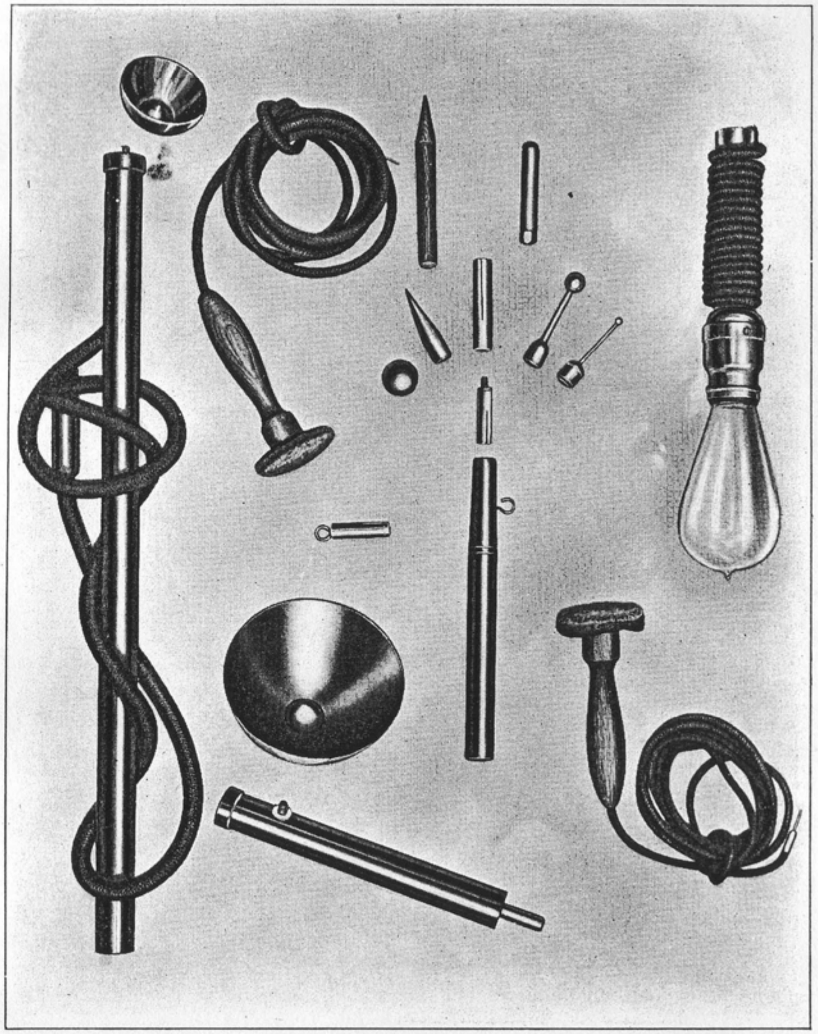
The whole effort of the designers of this Coil has been to produce an easily manipulated apparatus, giving a wide range of effects, any one of which can be repeated at any time by the same adjustments, which are easily comprehended and remembered. Although the appearance of the cabinet is simple and convenient, yet the amount and variety of hard work that can be obtained from it at any time will put far in the background the most powerful static machine, the large Rhumkorff Coil with its cumbersome high frequency attachment, and any ultra violet apparatus on the market, to say nothing of the cautery.

We do not believe it is possible by any other means of construction to produce a Coil capable of giving such enormous voltages and frequencies without quickly destroying itself. The Coil has been given the most exhaustive and thorough tests, and has met every requirement imposed upon it by the most exacting.

We have no hesitation in saying that there is no apparatus more flexible or under more perfect control for operating an X-Ray tube, or for high frequency work. A Geissler tube can be excited so that it will glow to any degree of brilliancy, and this light will remain absolutely steady as long as required. The Coil will deliver such an amount of current as to be beyond the capacity of most X-Ray tubes, or so little that the smallest tube can be made to barely glow. In X-Ray practice, by means of the spark gap alone, the bones of the hand may be seen as almost transparent or the whole hand itself may be made black, and this without change of vacuum in the tube.

THERMO-FARADIC

A unique feature, which we believe is found in this Coil only, is a Thermo-Faradic attachment; which, briefly stated, is a derived circuit from a closed coil of a certain proportion. The current is



ELECTRODES FOR JACKSON COIL

applied to the patient by means of either the well-known sponge electrodes or metallic handles, and can be widely varied by means of the spark gap and rheostat from a current markedly faradic in its characteristics and possessing great smoothness, to a current having no faradic effects and producing within the body a sensation of great heat; and that this is real heat locally generated is demonstrated by actual heating of the sponges, and by the sensations of the patient. If the metal electrodes are brought in close proximity to each other, a small but brilliant arc is produced of such intense heat that actual welding of copper (on a small scale) may be made possible. If two strips of metal are attached to this Coil and are placed in a little water, it will soon become very hot. By placing both of the electrodes on or near the diseased area, the effect will be strictly local; or by separation, widely diffused. Sufficient current may be taken in this manner without discomfort to bring to full brilliancy a sixteen candle power lamp, when placed in the same circuit with the patient. These currents are of true high frequency, oscillating millions of times per second, and are a modification of the D'Arsonval currents. By the use of the Thermo-Faradic attachment, excellent results are obtained in the treatment of inflammation, neuralgia, tubercular ulcers, sciatica and neurasthenia. The mode of operation is described in Bulletin 36.

CAUTERY EFFECTS

A powerful cautery transformer may be incorporated in the cabinet at a slight additional cost. The transformer gives a very large quantity of current at so low a voltage that diagnostic lamps or cautery knives may be used with perfect safety. The control is perfect and the graduations are fine. This transformer is entirely separate from and has no connection with the high frequency Coil, and there is absolutely no chance of getting a high voltage through it.

ULTRA VIOLET ATTACHMENT

If desired, the Ultra described on page 28 may be incorporated into this cabinet, making a simple, serviceable, and powerful Ultra Violet equipment.

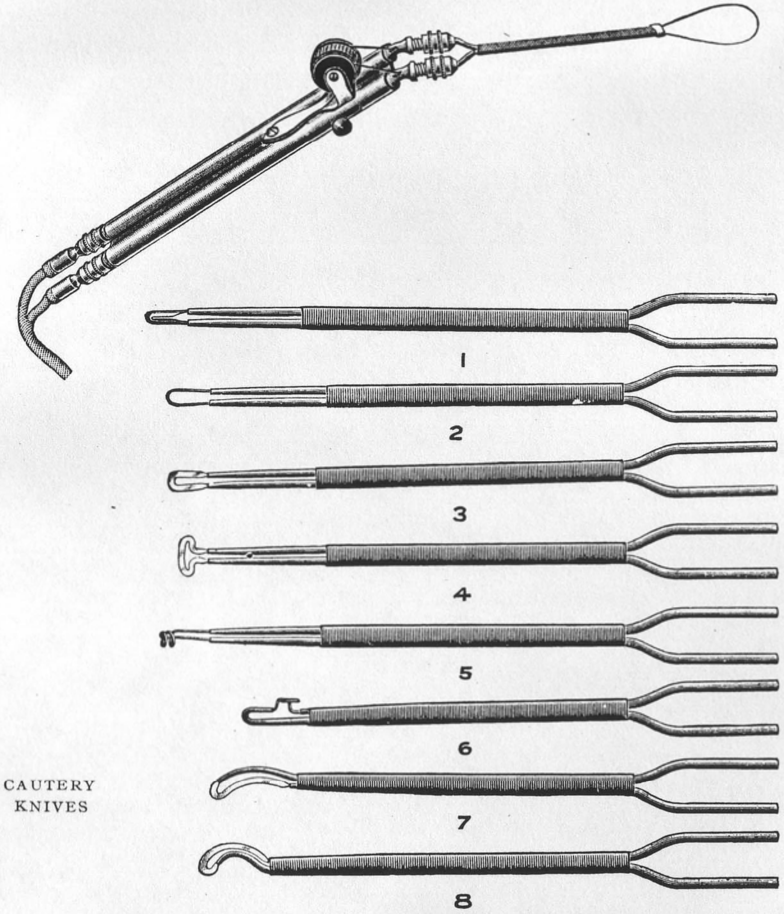
A very simple switching device is supplied and the lamp proper may be attached in place of the tube stand.

GUARANTEE

Each Coil guaranteed against any defect in workmanship or material, or against burn-out not caused by improper usage, for one year from date of shipment.

CODE WORDS

52 volts, 7,200 Alternations	Koperig
104 volts, 7,200 Alternations	Kopernikus
110 volts, 7,200 Alternations	Koperkies
52 volts, 16,000 Alternations	Koperkleur
110 volts, 16,000 Alternations	Kopermolen
110 volts, 15,000 Alternations	Kopermunt
110 volts, Direct Current	Intardatum
220 volts, Direct Current	Intardetis
235 volts, Direct Current	Intarlando
250 volts, Direct Current	Intarlare
500 volts, Direct Current	Intarlato



CAUTERY KNIVES

PRICE LIST

JACKSON HIGH FREQUENCY COIL, to run on any alternating current from 52 to 250 volts and any commercial cycle, complete as shown in cut, page 4, including electrodes, stand and tube holder . . . Price, $350.00
Code word, Heidengeld.

JACKSON HIGH FREQUENCY COIL for 110 volts direct current, as above, including motor generator . . . . Price, $420.00
Code word, Headledge.

JACKSON HIGH FREQUENCY COIL for 220 volts direct current, as above, including motor generator . . . . Price, $440.00
Code word, Heenkomen.

MOTOR GENERATOR including starting box, for 110 volts direct current, when sold without coil . . . . Price, $70.00
Code word, Hervatting.

MOTOR GENERATOR including starting box, for 220 volts direct current, when sold without coil . . . . Price, $90.00
Code word, Hervimos.

MOTOR GENERATOR including starting box, for 500 volts direct current, when sold without coil . . . . Price on application
Code word, Hervento.

CAUTERY TRANSFORMER, additional . . . . Price, $25.00
Code word, Curtelasse.

This transformer put up in fine case, to use separately from coil, $20.00.
Code word, Curtinho.

CAUTERY HANDLE with snare . . . . Price, $6.00
Code word, Curtem.

CAUTERY HANDLE, plain . . . . Price, $1.50
Code word, Curtiamos.

CAUTERY CORDS, per pair . . . . Price, $1.50
Code word, Curtidos.

CAUTERY KNIVES, No. 1 to No. 8 . . . . Price, each $0.75
See illustration on page 10.
Code word for set of eight, Curtilage.

ULTRA VIOLET ATTACHMENT, including lamp, cable and arm for tube stand . . . . Price, $60.00
Code word, Conjunctum.

COMPRESSOR with fine quartz lens . . . . Price, $5.00
Code word, Condate.

SET OF METALLIC HIGH FREQUENCY ELECTRODES, when sold separately . . . . Price, $10.00
Code word, Hervencia.

SET OF SIX GLASS VACUUM ELECTRODES with handle Price, $5.00
Code word, Koukarien.

SPECIAL H. F. X-RAY TUBE, as shown on page 6. . . . Price, $14.00
Code word, Depor.

MINERAL TUBES, to be used as electrodes, 20 inches long, very brilliant.
Code word, Denuam. Price, each $3.00

GEISSLER ELECTRODES, No. 17 and No. 18 filled with liquid, very highly colored. Price, each $2.00. Special set of six assorted colors, Price, $10.00

Code word, No. 17, Kourgan; No. 18, Kourilien; set of six, Kozel.

WILLEMITE TUBE, small X-Ray tube with piece of willemite for anode, very handsome and brilliant . . . . Price, $6.00

Code word, Demptos.

BLOCK TIN for X-Ray shields, per pound, $0.25. A strip thirty-six inches long by fifteen inches wide makes a pound.

Code word, Blemmyer.

LIST OF OUTFITS

In connection with any of the following outfits, a Milliamperemeter is recommended. This may be included at an additional cost of $30.00.

These outfits are given as samples only, and may be changed to suit the convenience of the purchaser.

OUTFIT NO. 60. For the alternating current.
Code word, Handlohn.

One Jackson Coil, complete, including set of metallic electrodes and tube stand	$350.00
One H. F. X-Ray Tube	14.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of Vacuum Electrodes with Handle	5.00
	$379.00

OUTFIT NO. 61. For the 110 volts direct current.
Code word, Handlubben.

Same as enumerated in Outfit No. 60	$379.00
One Motor Generator, complete, fitted in cabinet	70.00
	$449.00

For 220 volts, add to above, $20.00

OUTFIT NO. 62. For the alternating current.
Code word, Handlung.

One Jackson Coil, complete, including set of metallic electrodes and tube stand	$350.00
Two H. F. X-Ray Tubes	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of Vacuum Electrodes with Handle	5.00
One No. 17 and one No. 18 Electrode	4.00
Four pounds Block Tin	1.00
	$398.00

OUTFIT NO. 63. For the 110 volts direct current.
Code word, Handmagd.

Same as enumerated in Outfit No. 62	$398.00
Motor Generator, complete and fitted in cabinet	70.00
For 220 volts, add to above, $20.00.	$468.00

OUTFIT NO. 64. For the alternating current.
Code word, Handmaiden.

One Jackson Coil, complete, including set of metallic electrodes and tube stand	$350.00
Two H. F. X-Ray Tubes	28.00
One 6 x 8 Platinum Barium Cyanide Fluoroscope	16.00
One set of Vacuum Electrodes with Handle	5.00
One set of six No. 17 and No. 18 Electrodes	10.00
One roll of Block Tin, 10 pounds	2.50
Two Mineral Tubes	6.00
One Willemite Tube	5.00
	$422.50

OUTFIT NO. 65. For the 110 volts direct current.
Code word, Handmandel.

Same as enumerated in Outfit No. 64	$422.50
Motor Generator, complete and fitted in cabinet	70.00
For 220 volts, add to above, $20.00	$492.50

OUTFIT NO. 66. For the alternating current.
Code word, Handmesser.

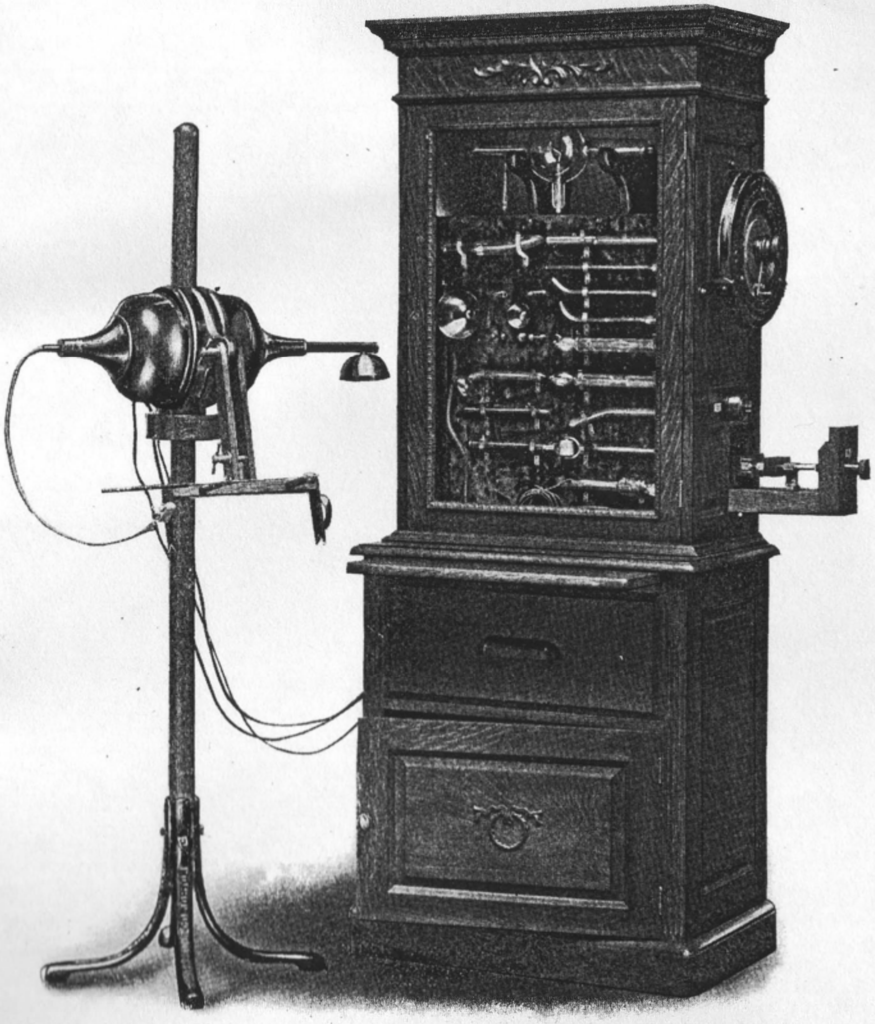
One Jackson Coil, complete, including set of metallic electrodes and tube stand	$350.00
Two H. F. X-Ray Tubes	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of Vacuum Electrodes with Handle	5.00
One set of six No. 17 and No. 18 Electrodes	10.00
One roll of Block Tin, 10 pounds	2.50
Two Mineral Tubes	6.00
One Willemite Tube	6.00
Cautery Attachment	25.00
One Handle and Snare	6.00
Eight Cautery Knives	6.00
Ultra Violet Attachment	60.00
One Quartz Compressor	5.00
One pair Cautery Cords	1.50
	$521.00

OUTFIT NO. 67. For the direct current.
Code word, Handmolen.

Same as enumerated in Outfit No. 66	$521.00
One Motor Generator complete, fitted in cabinet	70.00
For 220 volts, add to above, $20.00.	$591.00

If the Ultra Violet Attachment is desired in addition to any of the above outfits, except No. 66 and No. 67, where it is included, add $60,00, and for Cautery Transformer add $25.00, also price of handle, knives and cords as desired. See page 11.

In ordering, use outfit number or code word. Be sure to specify the current on which the coil is to be used, and if alternating current, the number of alternations as well as the voltage. For list of code words for the various currents, see page 10. Example: if you wish to order outfit No. 62, coil to be used on a current of 104 volts, 7200 alternations, to be shipped by express, wire as follows:—Express Handlung Kopernikus.



THE JACKSON SPECIAL COIL

The Jackson Special Coil

THIS cabinet was designed especially for those who wish to make an elaborate display in their office with a minimum of floor space. The wood work is of beautifully quartered oak, finely finished. The cabinet is about six and one-half feet high and well proportioned. The door or doors forming the front of the top section of the cabinet are of heavy bevelled plate glass.

As shown in the cut, the electrodes are mounted on a fine piece of velvet and make a very rich and handsome display. This arrangement makes them all easily accessible and protects them from injury. Brackets for two tubes are provided at the top.

The cabinet is built in two pieces as a matter of convenience in shipping and handling. In the lower section a sliding shelf is provided which will be found of great convenience. Below this is a large and deep drawer, so that an extra tube and fluoroscope may be placed therein. At the bottom of the cabinet is a door, back of which is a space sufficiently large to take a motor generator, if the coil is to be run on direct current, or which may be used for storage if the alternating current is used.

As shown in the cut, the spark gap, rheostat, and starting switch are located on the side of the cabinet out of the way but easy of access. The same design of portable secondaries is used as in the regular Jackson Coil, for only by this method can the entire output of the coil be delivered to the patient without leakage. It is a well-known fact that currents of extremely high frequency, as generated by this Coil, cannot be carried for any distance without great loss. The treatment by these portable secondaries is an important feature embodied in no other coil and fully covered by our patents.

All currents, High Frequency, Sinusoidal, X-Ray, Thermo-Faradic, and D'Arsonval, which are obtainable from the regular Jackson Coil, may be procured from the Jackson Special Coil. The ultra violet and cautery attachments cannot be included.

PRICE LIST

JACKSON SPECIAL COIL, shown in cut, including all electrodes, cords, and tube stand, for alternating current . . . . Price, $380.00
Code word, Kaiserhut.

JACKSON SPECIAL COIL for 110 volts, direct current, as above, including motor generator . . . . Price, $450.00
Code word, Kaiserin.

JACKSON SPECIAL COIL for 220 volts, direct current, as above, including motor generator . . . . Price, $470.00
Code word, Kaiserling.

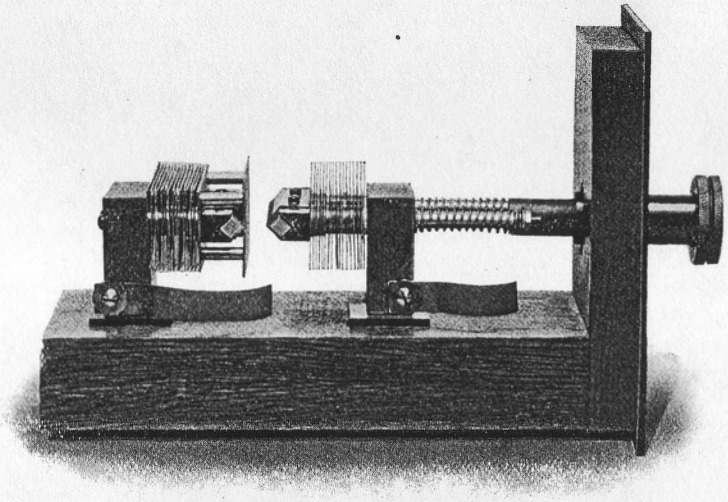
OUTFIT NO. 68. For the alternating current.
Code word, Kalomel.

Jackson Special Coil, as shown in cut	$380.00
One H. F. X-Ray Tube	14.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
Four pounds Block Tin	1.00
	$405.00

OUTFIT NO. 69. For the 110 volt direct current.
Code word, Kalong.

Same as in Outfit 68	$405.00
Motor Generator fitted in cabinet	70.00
	$475.00

For 220 volt, direct current, add to the above $20.00.



THE SPARK GAP

The Cyclone X-Ray *and* High Frequency Coil

We take pleasure in announcing to our friends of the medical profession the completion of a perfect X-Ray and High Frequency Coil.

This Coil, combining as it does all the best features of the Kinraide Coil with the spark gap and thermo-faradic attachment of the Jackson Coil, is, we confidently believe, the best for all-round work ever brought to your attention.

The cuts on pages 18, 20, 22, show the Coil in its various forms. The first, or floor type, is designed strictly for office use. The cabinet is of selected quartered oak, well finished. In the base are three drawers, two large and one small. The large ones are arranged to take tubes, fluoroscopes, etc., and the small one to take vacuum electrodes, cords, and the smaller parts.

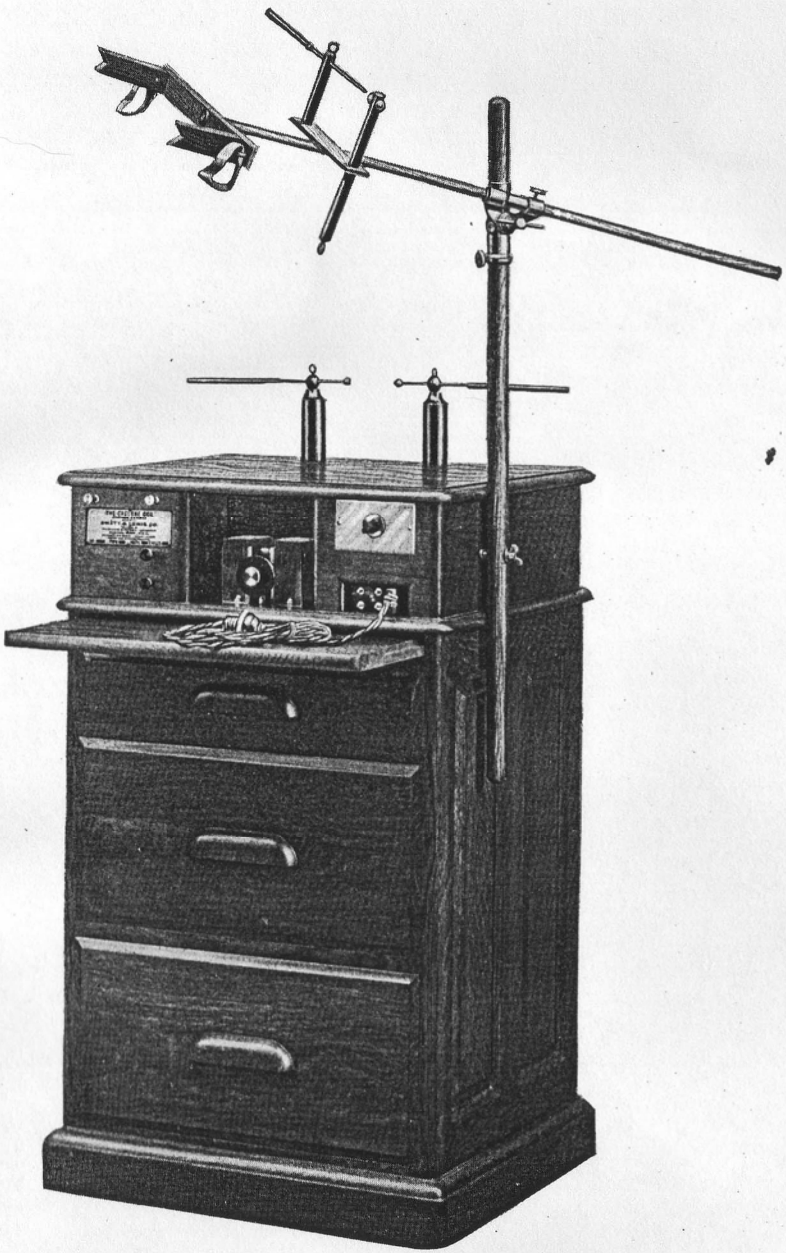
All switches and connections are conveniently placed on the front of the cabinet and are flush with the woodwork, so there is no chance of breakage or accidental shock. The spark gap is perfectly accessible, very easy of adjustment, and will run for hours without attention.

The tube stand is very conveniently arranged. The upright is attached to the side of the cabinet and the arm for holding the tube may be used in connection with the floor stand, if desired.

The whole outfit may be mounted on castors and easily moved about the office or hospital.

The Cyclone Desk Coil is really the top section described in the foregoing and is intended for use on a table or desk.

By referring to the cut, you will observe that the Portable Coil may be closed so as to make a very compact case, the dimensions being eight inches wide, ten inches high, twenty-one inches long, and may be carried in a street car or other conveyance. The tube stand, discharge rods, etc., may also be placed inside the case. A strap is provided for convenience in carrying. The case itself is made of selected hard wood, beautifully finished, and very ornamental. It is so constructed that the top section cannot be acci-



THE CYCLONE CABINET COIL

dentally displaced. To assemble, it is necessary only to lift off the top of the case and invert it.

As will be seen, each coil is complete in itself, and to operate it is necessary only to connect to the lamp socket by means of a cord and plug. The above coils differ only in the method of mounting. The winding, general construction and effects are the same in each case. The efficiency is very high, the volume of current given large, and the reliability absolute. They may be run continuously for hours without stopping, adjusting, or overheating.

THE SPARK GAP

The Spark Gap is a modification of the one which has been so heartily endorsed by the users of the Jackson Coil. This gap will run indefinitely without any attention whatever. It is adjusted by turning a screw on the outside of the case. There is no appreciable noise or light to annoy a sensitive patient. To quote from a user of one of these gaps, " It is perfect, and gives absolutely no trouble." The regulation is excellent, the mechanism is simple and impossible to get out of order. This sounds like perfection, but it is an absolute fact which will be proved by use in each case.

REGULATION

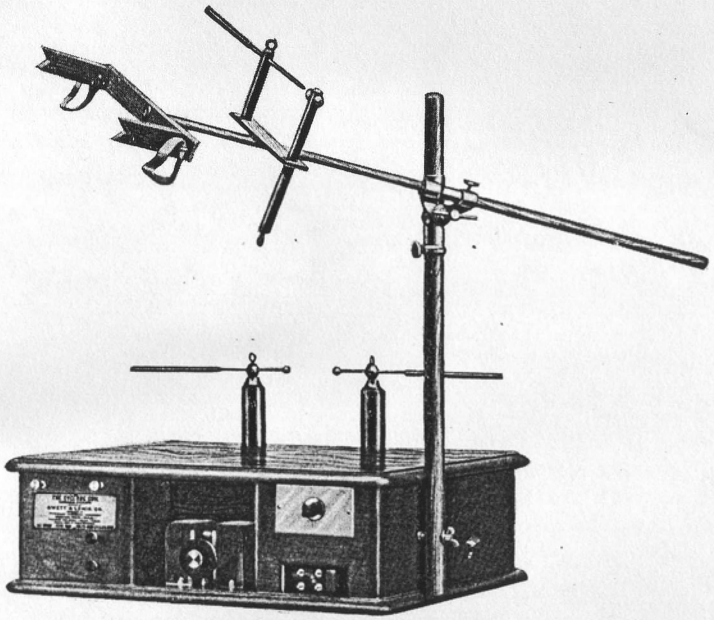
To attach the coil to the electric-light current, screw the plug on the end of the cord into the lamp socket, and slip the connector over the proper pair of pins designed for it. It will be observed that there are three sets of these. When the first set is used, the output of the coil is small and excellently adapted for vacuum electrode work. Great range is possible, for by means of the spark gap any desired effect may be obtained in the electrode from very faint illumination to the most brilliant and powerful. No rheostat is required.

X-RAY

The second set of pins is designed to give more power, and may be used for light X-Ray work where high penetration is not desired, for treating diseases of the skin, etc., also for operating thermo-faradic. Here the same range is procurable.

The third set of pins is used for the heaviest X-Ray work. Too much cannot be said of this. The fluoroscopic effects are fine, the penetration and definition are unexcelled. Pictures may be made in exceedingly short time.

The tube stand is ingeniously arranged. It may be slipped



THE CYCLONE DESK COIL

CARRYING CASE FOR TUBES, ETC.

into position instantly, and is capable of all necessary adjustments. A spark gap device for lowering the vacuum in the X-Ray tube is also provided.

It is our belief that these coils will fill a long-felt want, giving as they do the various X-Ray and high frequency currents hitherto obtainable only in large and expensive apparatus. The consumption of electricity is small, therefore the cost of running is very light.

The coils are designed to run from the alternating current exclusively. When only the direct current can be obtained, a rotary converter may be furnished to supply the alternating current. For cost, see price list.

PRICE LIST

THE CYCLONE COIL, Floor Type, including tube stand and connecting cords, fitted to run on any alternating current . . . . Price, $210.00
Code word, Gloriation.

THE CYCLONE COIL, Desk Type, including tube stand and connecting cords, fitted to run on any alternating current . . . . Price, $185.00
Code word, Gloriavamo.

THE CYCLONE COIL, Portable Type, including tube stand and connecting cords, fitted to run on any alternating current . . . . Price, $185.00
Code word, Glorificar.

ROTARY CONVERTER for changing the 110 volt direct current to alternating . . . . Price, $70.00
Code word, Hervatting.

ROTARY CONVERTER for changing the 220 volt direct current to alternating . . . . Price, $90.00
Code word, Hervimos.

LIST OF OUTFITS

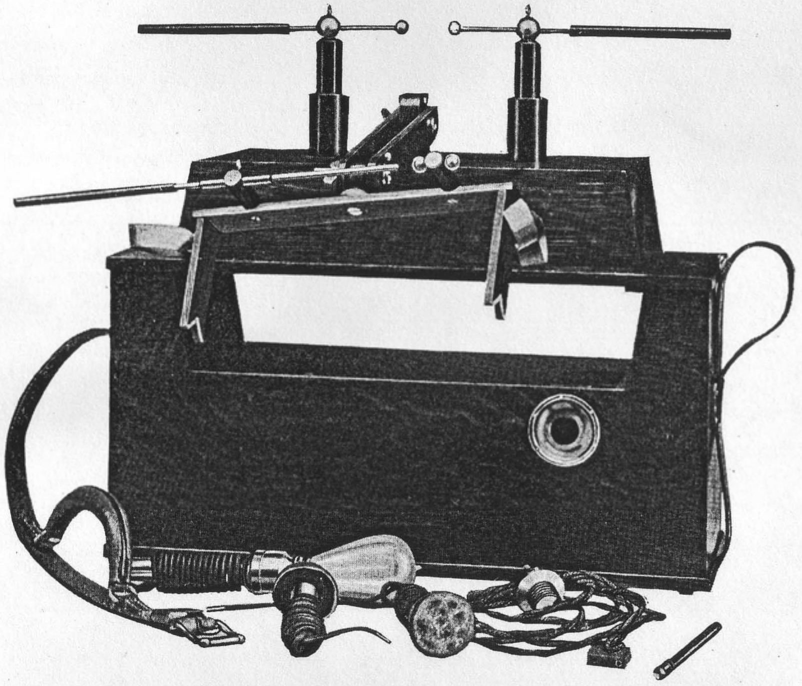
OUTFIT NO. 70. For the alternating current.
Code word, Kaaskamer.

The Cyclone Coil, Floor Type, including tube stand	$210.00
One H. F. X-Ray Tube	14.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of Vacuum Electrodes	5.00
	$239.00

OUTFIT NO. 71. For 110 volts, direct current.
Code word, Kaaskoek.

Same as enumerated in Outfit No. 70	$239.00
Rotary Converter	70.00
	$309.00

For 220 volts, add $20.00 to above.



THE CYCLONE PORTABLE COIL — OPEN

THE CYCLONE PORTABLE COIL — CLOSED

OUTFIT NO. 72. For the alternating current.
Code word, Kaaskooper.

The Cyclone Coil, Floor Type, including tube stand	$210.00
Two H. F. X-Ray Tubes	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of Vacuum Electrodes	5.00
Four pounds X-Ray Foil	1.00
One No. 17 and one No. 18 Electrode	2.00
	$256.00

OUTFIT NO. 73. For 110 volts, direct current.
Code word, Kaaskorf.

Same as enumerated in Outfit No. 72	$256.00
Rotary Converter	70.00
	$326.00

For 220 volts, add $20.00 to above.

OUTFIT NO. 74. For the alternating current.
Code word, Kaasleb.

The Cyclone Coil, Floor Type, including tube stand	$210.00
Two H. F. X-Ray Tubes	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
Four pounds X-Ray Foil	1.00
One set of six No. 17 and No. 18 Electrodes	10.00
One set of Vacuum Electrodes	5.00
Two Mineral Tubes	6.00
One High Frequency Milliamperemeter	30.00
Base and Standard of Floor Stand	5.00
	$305.00

OUTFIT NO. 75. For 110 volts, direct current.
Code word, Kaasmaden.

Same as enumerated in Outfit No. 74	$305.00
Rotary Converter	70.00
	$375.00

For 220 volts, add $20.00 to above.

OUTFIT NO. 76. For the alternating current.
Code word, Rhodanicum.

The Cyclone Coil, Desk Type, including tube stand	$185.00
One H. F. X-Ray Tube	14.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of Vacuum Electrodes	5.00
	$214.00

OUTFIT NO. 77. For 110 volts, direct current.
Code word, Rhodanthes.

Same as enumerated in Outfit No. 72	$214.00
Rotary Converter	70.00
	$284.00

For 220 volts, add $20.00 to above.

OUTFIT NO. 78. For the alternating current.
Code word, Rhodanusia.

The Cyclone Coil, Desk Type, including tube stand	$185.00
Two H. F. X-Ray Tubes	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of Vacuum Electrodes	5.00
Four pounds X-Ray Foil	1.00
One No. 17 and one No. 18 Electrode	4.00
	$233.00

OUTFIT NO. 79. For 110 volts, direct current.
Code word, Rhodees.

Same as enumerated in Outfit No. 78	$233.00
Rotary Converter	70.00
	$303.00

For 220 volts, add $20.00 to above.

OUTFIT NO. 80. For the alternating current.
Code word, Rhodensium.

The Cyclone Coil, Desk Type, including tube stand	$185.00
Two H. F. X-Ray Tubes	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
Four pounds X-Ray Foil	1.00
One set of six No. 17 and No. 18 Electrodes	10.00
One set of Vacuum Electrodes	5.00
Two Mineral Tubes	6.00
One High Frequency Milliamperemeter	30 00
Base and Standard of Floor Stand	5.00
	$280.00

OUTFIT NO. 81. For 110 volts, direct current.
Code word, Rhodiacos.

Same as enumerated in Outfit No. 80	$280.00
Rotary Converter	70.00
	$350.00

For 220 volts, add $20.00 to above.

OUTFIT NO. 90. For the alternating current.
Code word, Krent.

The Cyclone Coil, Portable Type, including tube stand	$185.00
One H. F. X-Ray Tube	14.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of six Vacuum Electrodes	5.00
Four pounds X-Ray Foil	1.00
	$215.00

OUTFIT NO. 91. For the alternating current.
Code word, Krepp.

The Cyclone Coil, Portable Type, including tube stand	$185.00
Two H. F. X-Ray Tubes	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of six Vacuum Electrodes	5.00
Eight pounds X-Ray Foil	2.00
One set of six Electrodes, No. 17 and No. 18	10.00
One Carrying Case for tubes and electrodes	10.00
	$250.00

OUTFIT NO. 92. For the alternating current.
Code word, Kresse.

The Cyclone Coil, Portable Type, including tube stand	$185.00
Two H. F. X-Ray Tubes	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One set of six Vacuum Electrodes	5.00
Four pounds X-Ray Foil	1.00
One No. 17 and one No. 18 Electrode	4.00
Two Mineral Tubes	6.00
One High Frequency Milliamperemeter	30.00
One Carrying Case for tube and electrodes	10.00
One Floor Tube Stand	10.00
	$289.00

These prices include the necessary connecting cords.

A nicely finished Carrying Case may be furnished for transporting X-Ray tube, electrodes, etc. ....Price, $10.00
Code word, Bisam.

To any of the above outfits may be added the base and standard of the Floor Stand, shown on page 32, to which the Tube Stand furnished with each coil may be attached, for $5.00.
Code word, Beffen.

If the direct current only is available, add to the above prices the cost of the rotary converter.

Books

Radiotherapy, Phototherapy and High Frequency Currents — *Allen*	$4.50
Radiotherapy and its Application to Skin Diseases — *Belot*	4.50
Currents of High Potential of High and Other Frequencies — *Snow*	2.50
Conservative Gynecology and Electro-Therapeutics — *Massey*	4.00
Static Electricity — *Snow*	3.00
Light Energy — *Cleaves*	5.00
Medical and Surgical Electricity — *Rockwell*	5.00
Electro-Therapeutical Practice — *Neiswanger*	2.50
Elements of General Radiotherapy — *Freund*	5.00
Vibratory Stimulation — *Pilgrim*	1.50
Mechanical Vibration Therapy — *Snow*	2.50

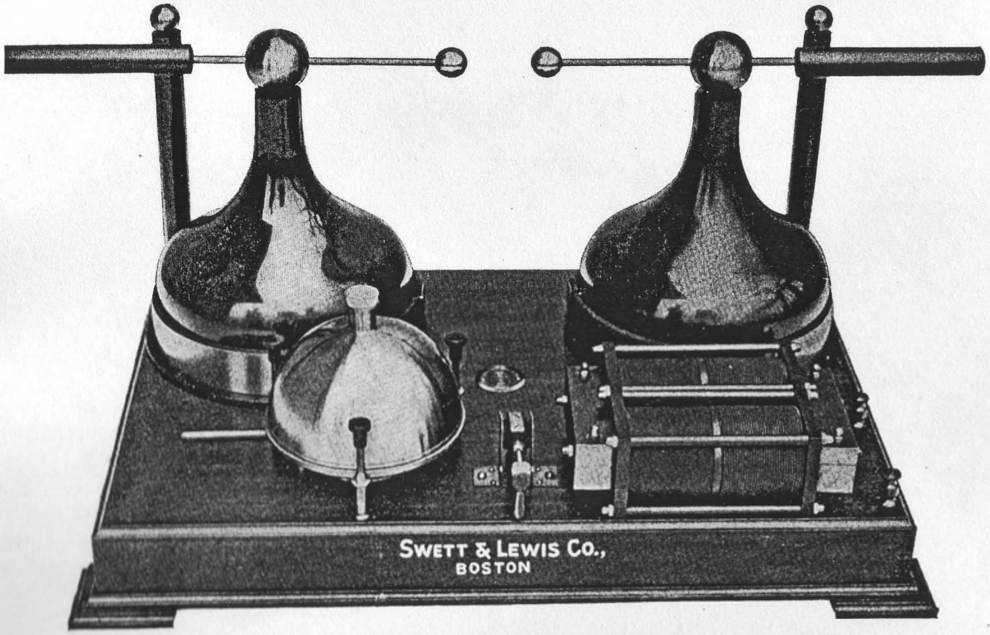
The Kinraide Coil

The Kinraide Coil is too well known to require an extended description.

Briefly, the Coil is of the high frequency type, is designed to run either on the direct or alternating current, is simple, substantial and reliable.

Owing to the peculiar method of construction, it is impossible to break it down or burn it out. The X-Ray work that may be accomplished with this Coil will compare favorably with that of any coil, anywhere near the same price. The current given is of high voltage, large quantity and of high frequency, but not as high as either the Jackson or the Cyclone coils.

For either X-Ray work or high frequency, a rheostat should be used to regulate the current.



THE KINRAIDE HIGH FREQUENCY COIL—ALTERNATING CURRENT

The Kinraide Coil	$130.00
(Direct and alternating currents of all voltages from 110 to 250)	
500-volt Coils, extra	20.00
Alternating Current Coil and Ultra combined	175.00
Rheostat	8.00

LIST OF OUTFITS

OUTFIT NO. 33. For Direct Current.
Code word, Unpublic.

One Direct Current Kinraide Coil	$130.00
Two Tubes, Type K	24.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One Floor Tube Stand	10.00
One Rheostat	8.00
	$182.00

OUTFIT NO. 34. For Alternating Current.
Code word, Vestifluam.

One Alternating Current Kinraide Coil	$130.00
Two Tubes, Type H	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One Floor Tube Stand	10.00
One Rheostat	8.00
	$186.00

OUTFIT NO. 37. For Alternating Current.
Code word, Timindos

One Alternating Current Kinraide Coil and Ultra Violet Apparatus combined	$175.00
Two Tubes, Type H.	28.00
One 5 x 7 Platinum Barium Cyanide Fluoroscope	10.00
One Floor Tube Stand	10.00
One Rheostat	8.00
	$231.00

We recommend the purchase of a set of Vacuum Electrodes, price, $5.00, with each of the above outfits, also four pounds of X-Ray Foil, price, $1.00.

The Boston Ultra Violet Lamp

This outfit is mounted on a piece of polished slate and is intended to fasten to the wall. As in the Ultra, iron electrodes are used, with similar results. With this outfit, the patient can hold the lamp by the handle and use the crystal lens as a compressor. Sufficient cable is furnshed for all ordinary uses.

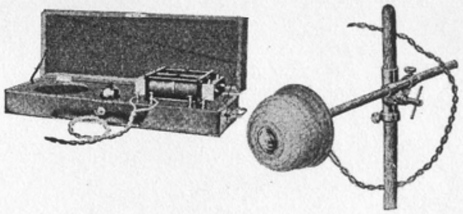
This outfit may be used on any direct current circuit up to and including 250 volts.

Code word, Eligam	Price, $30.00

Ultra Violet Effects

The Ultra shown below generates the true Ultra Violet rays with but few light rays. We have taken advantage of the fact that condenser currents of high voltage, when used in connection with iron electrodes, will produce the Ultra Violet rays with few light or heat rays.

The lamp is really a diminutive arc, entirely enclosed in a nice nickel case, and having in front a fine rock-crystal lens, which is perfectly transparent to the Ultra Violet ray. Instead of carbons, the electrodes of the lamp are of iron. They are regulated by a small thumb-screw at the back of the lamp, and are very easily adjusted. This lamp may be supported by any available stand. It is, however, designed with special reference to the floor stand illustrated on page 32 of this bulletin.



In connection with this stand, the lamp may be placed at any angle or height, and rotated in any direction with ease. Very little heat is generated and no cooling or coloring device is necessary.

The arc is very rich in invisible Ultra Violet rays, so much so that the eyes must be protected with glasses or some opaque substance at all times when near the lamp.

The cost of running a lamp of this sort is small.

Built for alternating current only.

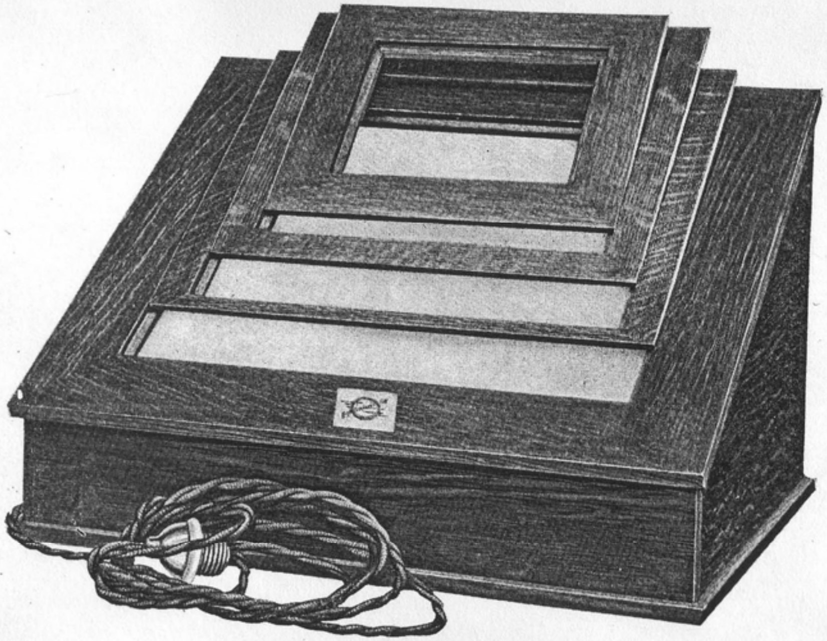
Twelve extra electrodes and full instructions for use go with each lamp.

The lamp which forms a part of this apparatus can be attached to any Kinraide Coil, run on the alternating circuit. It will, however, be necessary to send the coil to our factory in order to have the necessary switches put on and changes made. This can be done without detriment to the working of the coil.

Price complete, as shown in cut, with stand for supporting lamp	$110.00
Price without stand	100.00
Ultra Lamp, connecting cord, switches, and all necessary attachments fitted to any alternating current Kinraide Coil, new or old	Price, $50.00

Freight or express charges to be paid by owner of coil.

Illuminating Box



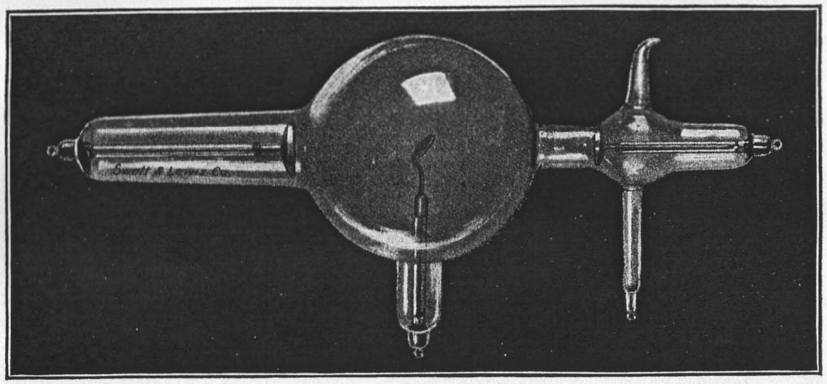
The Box is of quartered oak, nicely finished. A number of frames arranged to take the various sizes of plates are furnished. The inside is enamelled white and a sufficient number of electric lamps are so arranged as to furnish the proper degree of illumination. The top is of ground glass. When viewed in this way, a surprising amount of detail will be shown in an ordinary X-Ray negative.

Code word, Sortance	Price, $20.00

X-Ray Tubes

TYPE H. F.

The type H. F. Tube was designed specially for use with high frequency coils, and is a modification of the old Type H, combined with the valve tube so called. The reversed waves are choked back so that the hemispherical effect so familiar to static users is produced. This Tube should be a general favorite, as it is capable of very hard usage. It is recommended for all coils giving an alternating current. The Tube is strongly built, the bulb of good size, and the terminals are well supported, so that they will not break down either in use or during transportation.



SPECIAL H. F. X-RAY TUBE

Code word, Dejor . . . . Price, $14.00

TYPE K.

This Tube is of good size and shape and is designed for heavy work. The anode is very heavy and is supported on a steel rod. It may be heated to a bright red, and held at this point for a long time without danger of injury to the tube or anode. The definition and penetration are exceptionally good.

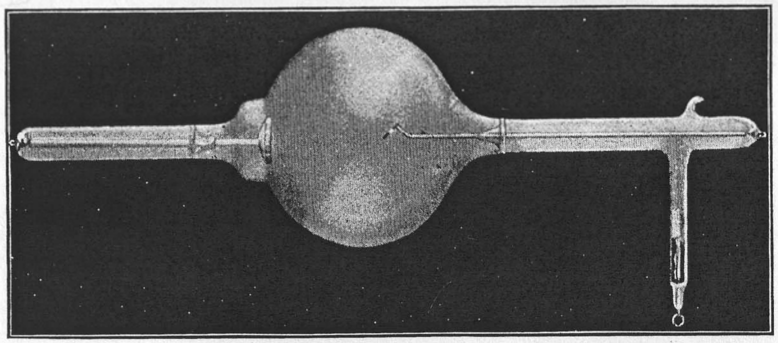
The Tube is fitted with a chemical adjustment, which may be operated either by heat or spark. If too much gas is driven off, it will be re-absorbed, if the Tube is allowed to rest for a short time.

Code word, Delustro . . . . Price, $12.00

X-Ray Plates

A supply of the following sizes always in stock. These Plates are specially wrapped in light proof paper, no plate holder being required for use with the X-Ray.

5 x 7	$1.40 per dozen.	Code word, Einhergang
6½ x 8½	2.30 per dozen.	Code word, Einhuellen
8 x 10	3.40 per dozen.	Code word, Einimpfen
10 x 12	5.50 per dozen.	Code word, Einjæhrig
11 x 14	7.00 per dozen.	Code word, Einjagen



TYPE K, FOR DIRECT CURRENT COILS

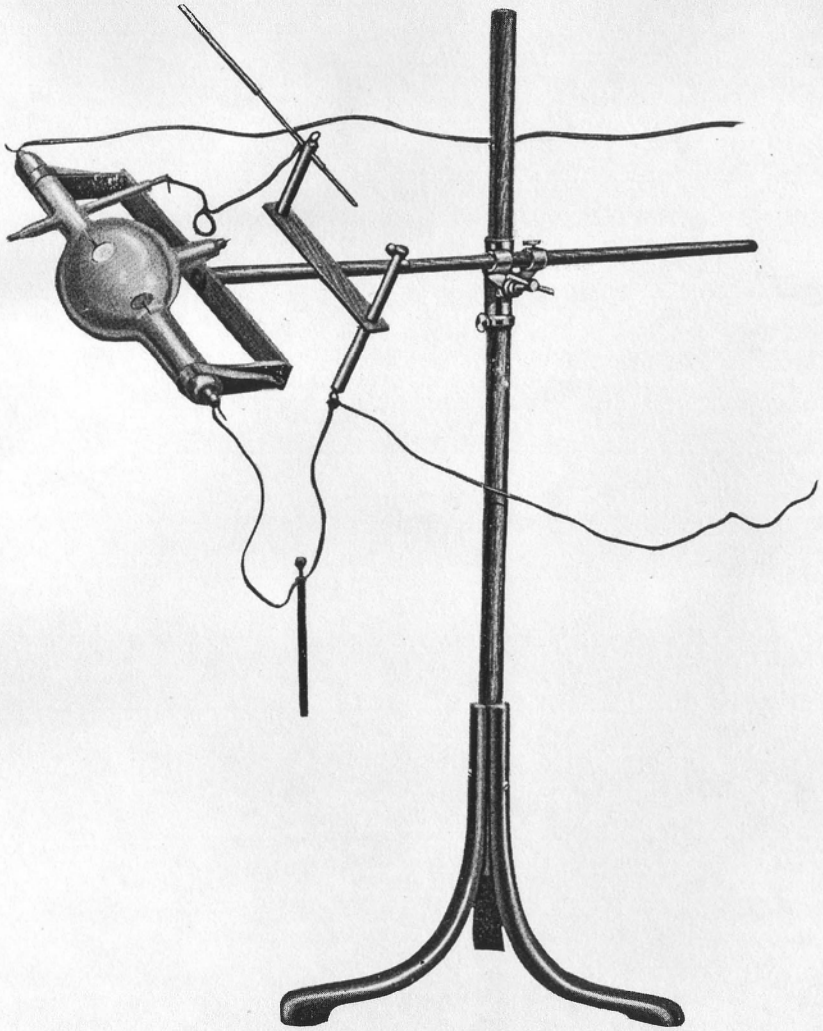
Tube Stands

(See cut on page 32)

The Stand shown in the cut is capable of all adjustments. It will hold a tube rigidly in any position and at any height.

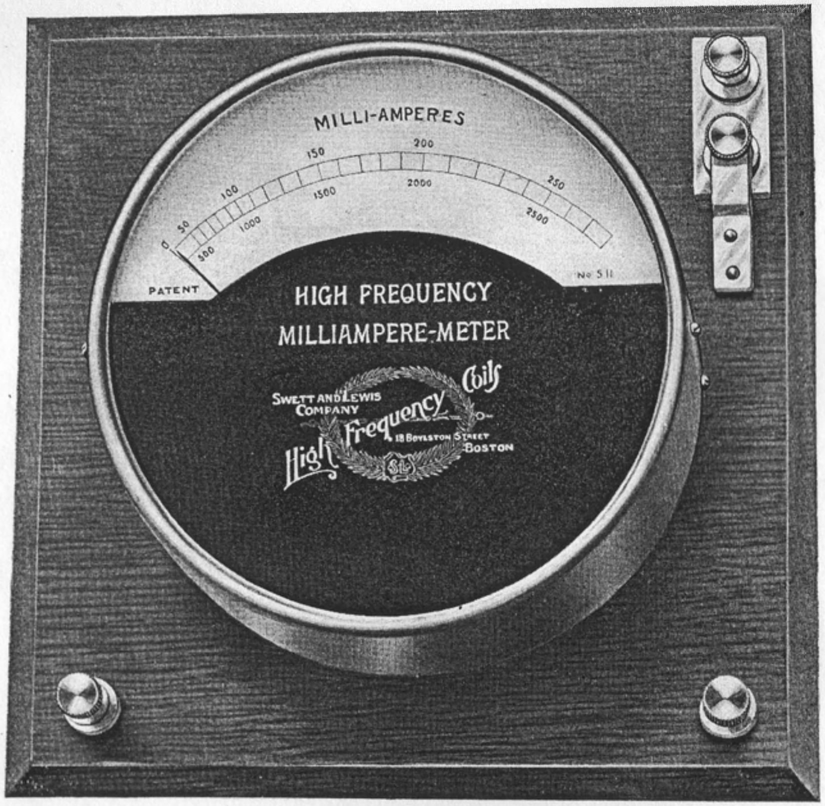
By a new arrangement of connections, the vacuum in an adjustable tube may be held at any desired point without leakage through the adjustment. This is very important, as by the older methods there was a constant leakage which tended to lower the vacuum. This same method of connection is now used on all our stands.

Floor Tube Stand, with Adjustable Spark Gap and Pair of Cords	$10.00.	Code word, Finados
Set of Cords, heavily insulated	1.00.	Code word, Finances
Small Wooden Tube Stand	2.00.	Code word, Finage



TUBE STAND

Milliamperemeter

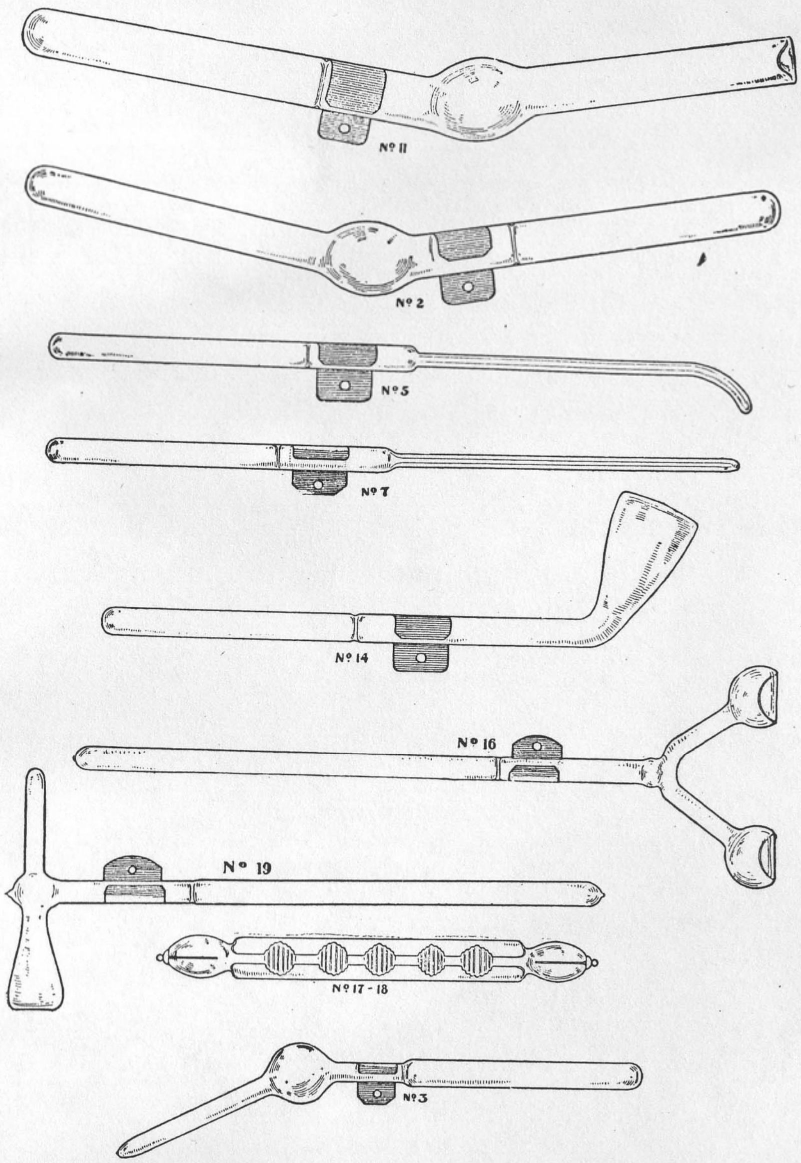

MILLI-AMPERES
0
50
100
150
200
250
500
1000
1500
2000
2500
PATENT
No 511
HIGH FREQUENCY
MILLIAMPERE-METER
Swett and Lewis Company
High Frequency Coils
18 Boylston Street
Boston

It has but recently been possible to secure a reliable meter to measure currents of high and other frequencies. The value of an instrument of this sort must be conceded by all. For all-round work, the one illustrated is without a peer. It will record accurately the dosage on any current which a physician may wish to administer, galvanic, faradic, static, high frequency and X-Ray.

The meter has a high and a low scale, the former reading to 2500 milliamperes, and the latter to 250. The case is of beautifully finished brass, and is mounted on an oak base.

Full directions for connecting and operating accompany each instrument.

Code word, Sostegno . . . . Price, $30.00



VACUUM ELECTRODES

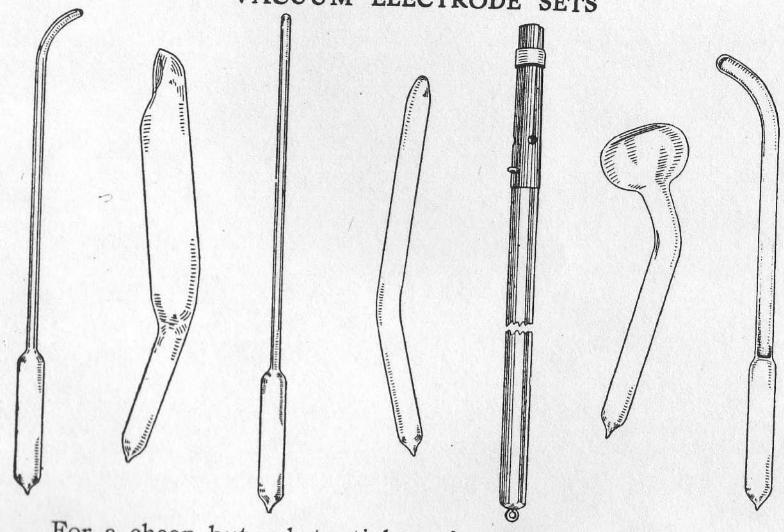
Vacuum Electrodes

These Electrodes are well and substantially made, and are highly colored. They will work on either a coil or static machine.

Electrodes Nos. 17 and 18 are especially fine in color effects. In ordering, please specify colors desired. They can be furnished in green, blue, red, or purple.

No. 14	For general application . . .	$1.50.	Code word, Kræmerin
No. 2	For vaginal application . . .	1.50.	Code word, Kræmpeln
No. 3	For rectal application	1.50.	Code word, Kræmpe
No. 11	For vaginal application, with cupped end	1.50.	Code word, Krænkende
No. 5	For urethral application, with curved end	1.50.	Code word, Krænker
No. 7	For urethral application, straight .	1.50.	Code word, Krænklich
No. 15	For eye application	1.50.	Code word, Krænkung
No. 16	Double Eye Electrode	1.50.	Code word, Krætze
No. 19	Hammer Electrode	1.50.	Code word, Krætzig
No. 18	Geissler Electrode, for general tonic treatment	2.00.	Code word, Kourilien
No. 17	(Not so highly colored as No. 18) .	2.00.	Code word, Kourgan
No. 1	For use around the spine. Shaped like a tuning fork	1.50.	Code word, Krænseln
One pair Metal Handles and Cords . . .		1.00.	

VACUUM ELECTRODE SETS



For a cheap but substantial set for all-round use, containing all of the most used Electrodes, the one shown in the above cut is recommended.

The Electrodes are as follows:

	Handle	$1.00.	Code word, Koulbac
No. 3A	Rectal (without bulb)	1.00.	Code word, Kouler
No. 5A	Urethral, curved	1.00.	Code word, Koulougli
No. 7A	Urethral, straight	1.00.	Code word, Koumiss
No. 11A	Vaginal, with cupped end	1.00.	Code word, Koupara
No. 14A	General external work	1.00.	Code word, Koupholite
No. 20A	Eustachian	1.00.	Code word, Kourakin
Price for Set and Handle		5.00.	Code word, Koukarien

A firm insulating handle, fitted with a universal coupling, will complete the set.

⁂

Fluoroscopes

Platinum Barium Cyanide Fluoroscope, 4 x 5 (code word, Eapse)	$8.00
Platinum Barium Cyanide Fluoroscope, 5 x 7 (code word, Earshrift)	10.00
Platinum Barium Cyanide Fluoroscope, 6 x 8 (code word, Earthling)	16.00
Platinum Barium Cyanide Fluoroscope, 8 x 10 (code word, Earthly)	24.00

⁂

TERMS

Prices in this bulletin are net, except where cash accompanies order, in which case a discount of five per cent will be allowed.

In case of C. O. D. shipments, where a draft of twenty-five per cent of bill accompanies order, the same discount may be taken.

Remit by express or post-office money order or by New York draft. Add twenty-five cents to face of all checks, except on New York or Boston, to cover collection charges.

REFERENCES

Customers unknown to us must give satisfactory references, send draft with order, or we will ship C. O. D., charges for return of money to be borne by purchaser.

Goods will be delivered f. o. b. freight or express, Boston, Mass. No charge for packing. Each piece of apparatus is carefully packed and no allowance will be made for loss or breakage in transit.

Western Union Telegraph code used. Telegraph and cable address, "Swettxray."

When in Boston, we shall be glad to have you make your headquarters at our office.

MECO 23814

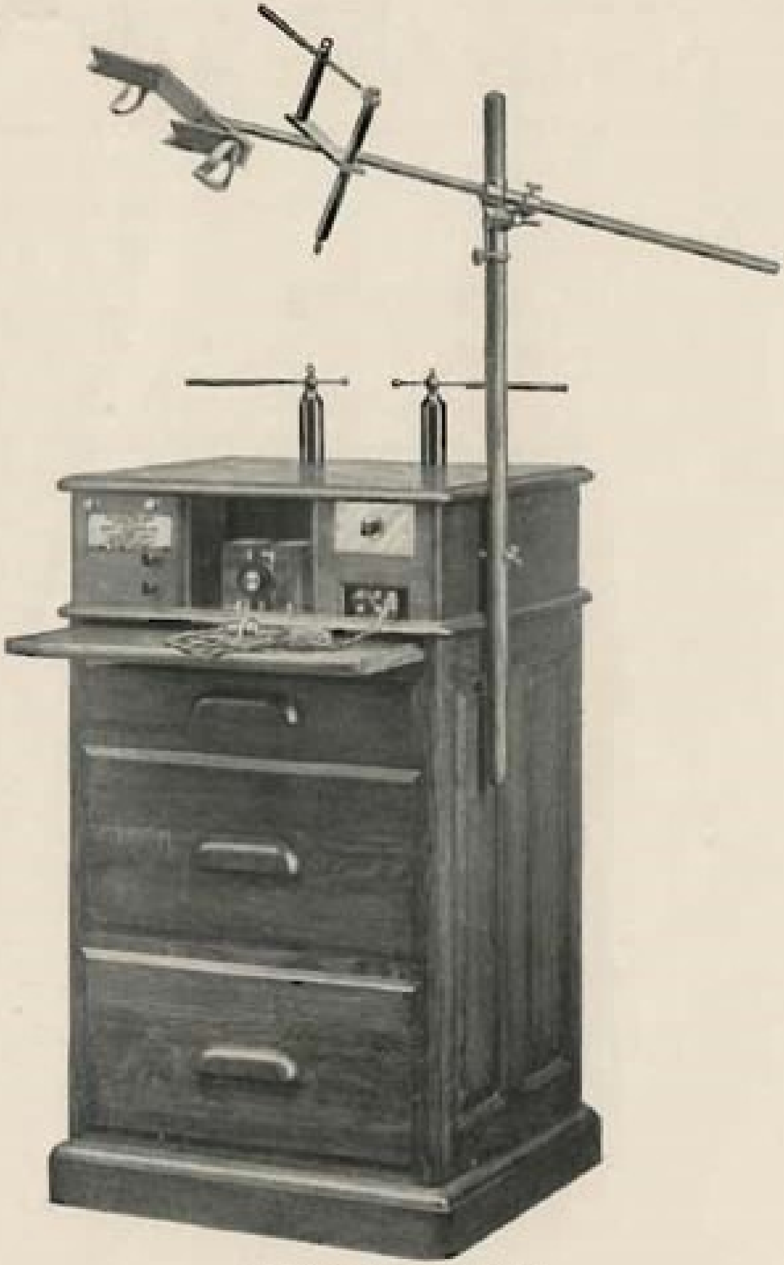
DIRECTIONS FOR SETTING UP AND OPERATING

The CYCLONE COIL

SWETT & LEWIS COMPANY
18 Boylston Street, Boston, Mass.

PRESS OF
MURRAY AND EMERY COMPANY
BOSTON, MASSACHUSETTS

*Bulletin Number
Thirty-eight*



THE CYCLONE CABINET COIL

DON'T run the coil unless the discharge rods are in place so as to allow the current to discharge into the air.

DON'T expect the best results with the spark gap badly burned.

DON'T forget to oil the spark gap screw occasionally.

DON'T start the X-Ray tube with the spark gap open, or stop it before closing the gap.

DON'T run the coil on the direct current. It is intended for the alternating current only.

respiration, heart, and the vaso-motor system. The application here should be gentle, and continued until the skin shows a slight redness. The effects are most satisfactory.

Patients suffering from neurasthenia (resulting from overwork and worry), insomnia, etc., respond to a treatment as above described, better than any other kind of medical treatment.

For the ache of muscular rheumatism and neuritis, apply directly over the painful part, making the current sufficiently mild that it may be borne for a ten-minute application. This treatment may be repeated two or three times the same day, should the pain return.

Applied over the area of the liver, it stimulates its functions, increasing the flow of bile and the chemical change in the blood from the viscera of digestion. The high frequency current from the No. 14 electrode is a valuable adjunct in the treatment of skin diseases.

Of the special electrodes, the small eye electrode is useful in the treatment of migrame; No. 2 in toning up the vaginal glands and curing leucorrhœa; No. 11 in healing cervical erosions; No. 3 in treatment of piles and puritus ani; Nos. 5 and 7 in the treatment of urithritis.

No special couch, chair, or insulating platform is required. Any wooden chair, which does not have metal springs, may be used.

For books on high frequency treatment, see High Frequency Currents, by Chisholm Williams, price, $2.75; Currents of High Potential, of High and Other Frequencies, by William Benham Snow, price, $2.50; Elements of General Radiotherapy, by Leopold Freund, price, $5.00.

Directions for Setting Up and Operating the Cyclone Coil

Unpack carefully and see that no small parts are left in the packing material.

Assembling.

The coil is shipped assembled, and needs but unpacking and connecting to the lamp socket to be ready for use. A glance at the cut will give you a general idea of how the parts of the tube stand should be arranged. They are easily assembled by the aid of a screw-driver.

Connections.

With each coil is furnished a cord with a square connector on one end, and on the other an attaching plug, which should be screwed into the lamp socket. On the right-hand side of the cabinet will be seen three sets of pins marked, Weak, Medium, and Strong. The square connector may be slipped on any set of pins desired. On the opposite side are found two sets of holes marked, Thermo-Faradic and High Frequency, also two switch pins with hard rubber heads. These pins should be inserted in the proper pair of holes according to the current desired. In case of the thermo-faradic, the sponge or the lamp and sponge, should be attached to the binding posts directly above the holes. This arrangement differs on the Portable Coil. See Special Directions.

Special Directions for Operating the Cyclone Portable Coil.

Never lift the coil by the strap unless the top section is locked in position.

Observe that the top section is located by two rubber steady pins, one of which is much nearer the end than the other. This is to prevent reversing and misconnection when the top section is inverted. When the top is rightly placed on the base, neither end will project. Be sure that the spring pins strike the contact plates. This they must do if the top section is properly located.

Be sure to examine the factory method of packing the small parts within the coil before disturbing their arrangement.

Place the hard rubber extension pieces in the hard rubber secondary posts by a slight twisting movement, then slip the discharge rods over the pins on the top of these extension pieces. Never run a coil unless the discharge rods are in place just as described, otherwise it will be damaged. To remove the extension pieces, lift and rock them. Do not try to twist them out, as that is likely to set them more firmly.

The arrangement of the tube stand can readily be ascertained from the illustration. This stand is necessarily small and should not be abused. It will be seen that a little pressure on the wing nuts will firmly hold the small parts. Too much pressure should not be used. If adjustment is desired, be sure to slack off the nuts first and do not try to force into position.

The pin switching device will be found inside of the base in the end opposite the spark gap. If both switch pins with the hard rubber heads are placed in the holes marked High Frequency, the secondaries will be excited, if they are in the proper position as before mentioned.

X-Ray.

First be sure that the main switch is off or the square connector disconnected from the pins and the spark gap closed. Place the tube in the stand and connect as per diagram. Slip the small adjusting handle with ball on end No. 20 over the wire No. 21, in such a position that it may easily be brought up to ball No. 15. Have the gap at A open from 2½ to 3 inches. Connect wires No. 21 and No. 22 to the rings in the pole pieces of coil Place the square connector over the proper pair of pins: Strong, if powerful effects are desired; Medium, if weaker. Turn the switch to ON. Then open the spark gap gradually until the desired effect is

are of a peculiar character and capable of producing blisters. They can be easily avoided by moving the sponges around, keeping always in contact with the flesh, and by closing the spark gap before removing them. If less current is used, the heat effect disappears, the current becomes markedly faradic in its character but possesses great smoothness on account of the enormous frequency and perfectly steady oscillations.

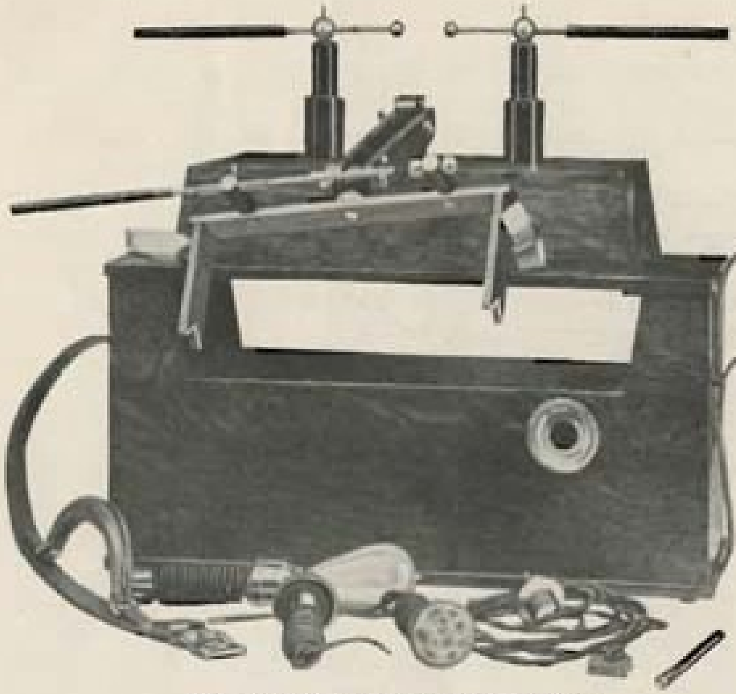
Vacuum Electrode Effects.

Attach one end of the insulated wire to the electrode, the other to one of the pole pieces. One pole only may be used, or the patient may be connected in circuit by holding in one hand a glass or metal electrode attached to the opposite pole, while the other electrode is applied by the operator. Start with the spark gap closed and the square connector on Weak or Medium. Increase current as desired by opening the spark gap. The operator applies the electrode with one hand, using the other to hold the wire aloof from the patient, by means of an insulated handle.

The electrodes may be applied directly in contact with the skin, which produces a sensation of mere warmth, or held at a little distance, when a spray or sparks are delivered according to strength of current. Electrode No. 14 may be applied equally well through the clothing. Hairpins, or articles of clothing containing metal, etc., must be removed for local application to the parts. The amount of insulation of the clothing varies so much that it must be determined for each individual case.

The discharge from the electrodes can be varied from a bare sensation of warmth to painful sparks. This may be accomplished by the adjustment of the spark gap, and if a mild application is desired, by inserting a No. 17 or No. 18 electrode in the middle of the wire to which the operator's electrode is attached.

No. 14 electrode, with moderate current applied in a general treatment over arms, legs, and body, produces a general tonic effect, bringing the blood to the surface, and by causing gentle muscular contractions enhances cell metabolism. A favorite application for tonic treatment is over the medulla, the great nerve centre of

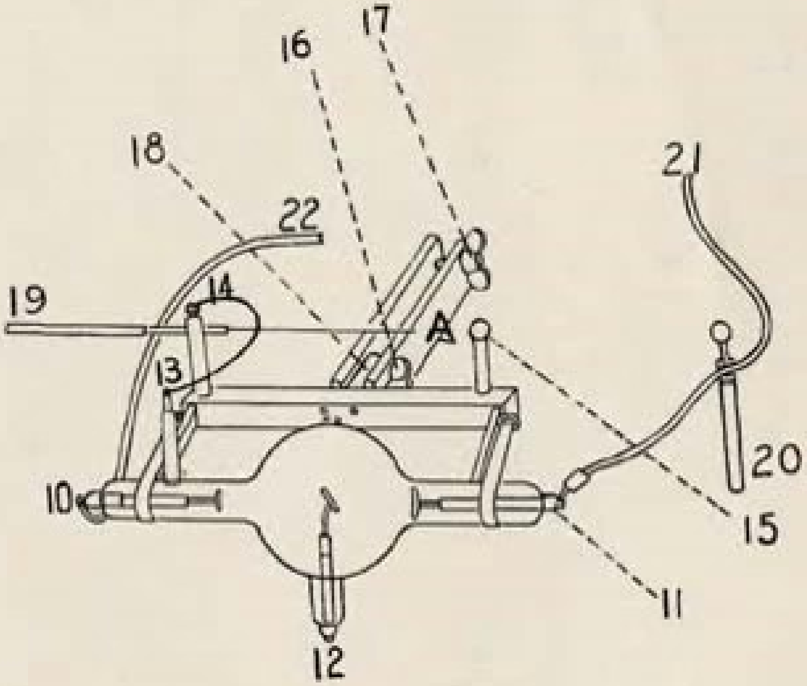


THE CYCLONE PORTABLE COIL — OPEN

THE CYCLONE PORTABLE COIL — CLOSED

obtained from the tube. In working either an X-Ray tube or vacuum electrode, the switch pins must always be in hole marked High Frequency.

Should the vacuum in the tube be too high, bring handle No. 20 up to ball No. 15, and allow it to remain in contact as long as sparks pass across at A. When they cease, the tube will be found low enough. Shortening the distance at A in connection with handle No. 20 will lower the vacuum, lengthening it will raise the vacuum.



To obtain a maximum X-Ray effect, the spark gap should be opened gradually until just before it ceases to operate. If the sparking at the gap stops, turn it back until it begins again, then open once more as far as possible. Perfect control may be obtained by the spark gap and by moving the square connector to the different sets of regulating pins. Anything between the smallest and the largest amount of current may readily be obtained.

A space of about three inches will give a high vacuum, or hard tube; a space of one inch, a low vacuum, or soft tube, etc.

Never allow gap A to be closed while the coil is running, for if it is, too much gas will be driven off, bringing the vacuum too low for X-Ray purposes. Should an accident of this sort happen, put the tube away for a week or two, and after that time the gas will probably have been reabsorbed. The vacuum may be raised by running the tube until the anode becomes red, then resting it for a few minutes, then running again until the anode reddens. If this is repeated a few times and the tube allowed to rest for an hour or longer, it is usually high enough for all purposes.

A brief explanation will make the adjusting apparatus clear. Electricity always travels by the easiest course; it will, therefore, go through the tube if the vacuum is not too high, but if it is too high, it will travel by the course A. This sends sparks through the chemical bulb, No. 13, liberating gas. This continues till the vacuum is lowered to a point where the current resumes its passage through the tube.

The electrodes of the spark gap can easily be unscrewed by the fingers or plyers, and may be polished by rubbing on a piece of sand or emery paper. A little brightening once in a while will improve the running of the coil. An extra pair of electrodes is furnished with each coil and will be found sufficient for months of continuous work.

When running the tube or electrodes, the cords carrying the current must not touch the woodwork near the secondary posts. The cords should be at least one inch or more away from the woodwork. If they are loosely knotted this may be accomplished with ease.

Milliampere meter.

Place the milliampere-meter on some convenient support. If the instrument is set on the top of the coil, it should be placed on a thick piece of felt or a magazine so as to raise it from the woodwork. Connect by means of a short cord with one pole piece and with one binding post. From the other binding post on the meter run a cord to the vacuum electrodes, or wire No. 22, to the X-Ray tube.

When using the thermo-faradic, run the short cord to one of the thermo-faradic binding posts, and connect to the other binding post as usual. To the second meter post, attach the cord running to either the lamp or sponge. On the thermo-faradic, use only the high scale or the meter may be injured.

Thermo-Faradic Effects.

In starting, see that the switch pins are in holes marked Thermo-Faradic, that the spark gap is closed and that the square connector is on pins marked Weak or Medium, according to whether mild or strong currents are desired.

In starting, always open the spark gap slowly, and in stopping, always close before removing the electrode from the patient.

Thoroughly wet sponges, or other electrodes, should be attached to the thermo-faradic binding posts and applied as may be desired to the patient. Two currents of markedly different character may be obtained and changed at will by means of the spark gap or regulating pins. If the full current is used with an exceedingly small spark gap increasing from mere nothing until the current becomes painful to the patient, and properly graduated, no electrical sensation will be felt. A sensation of heat will be produced under and at a considerable distance from the sponges, one of which generally becomes hotter than the other. If too much spark gap and current are used this heat will soon become unbearable. If it is desired, the current may be sent to the patient by means of the incandescent lamp, and a sponge used for its return. By this means, the filament of the lamp is in series with the patient, and will glow to a greater or less extent according to the current received. It is not difficult to bear, for a short time, a current of sufficient strength to bring the lamp to full brilliancy. With the spark-gap open, the current will be strong, and some sparks will be noticed on applying or removing the sponges. These sparks

Bulletin No. 24.

Static Machines, X-Ray Supplies, AND Electro-Therapeutical Apparatus.

◆

Manufactured by

SWETT & LEWIS CO.,

79 Franklin Street, Formerly 11 Bromfield Street,

BOSTON, MASS.

GREETING.

We wish to thank our customers for their cordial support of the last three years. On our part we have striven to warrant this patronage by improving our apparatus every way in our power.

In March last, we purchased the business and good-will of the American Roentgen Ray Co., and in our new machines we will incorporate the best features of their machines together with the tried and proven parts of our own, making our modern outfit the culmination of years of practice and experiment.

The manufacturing department of our business has been placed in the hands of Mr. Howard Jackson, a well-known electrical engineer, and all goods are made under the direct personal supervision of our manager, Frank H. Swett, M. E.

We have added to our line of static and X-ray apparatus a full line of galvanic and faradic batteries, light sets, and everything in electro-medical equipment and supplies.

SWETT & LEWIS CO.,

Successors to

G. A. FREI & CO., and AMERICAN ROENTGEN RAY CO.

July 7 1901

TO PURCHASERS.

Terms cash.

The prices in this catalogue are *net*, subject to change without notice.

Five (5) per cent. discount will be allowed when cash accompanies the order. Goods will be sent C. O. D. when at least 20 per cent. of the entire amount of invoice accompanies order. Return charges are at expense of purchaser.

Remittances should be made by New York bank draft, express or postal order.

Goods will be delivered F. O. B., freight or express, Boston, Mass.

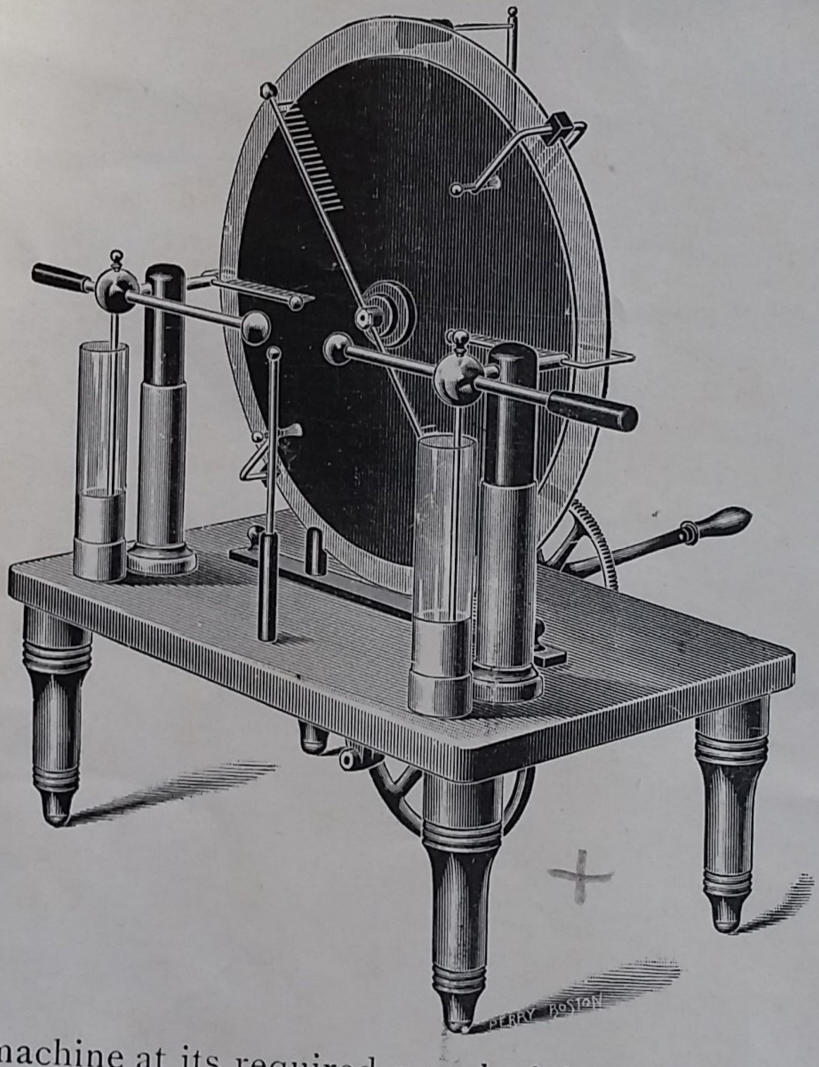
No charge is made for packing.

Each piece of apparatus is carefully packed, and no allowance will be made for breakage in transit.

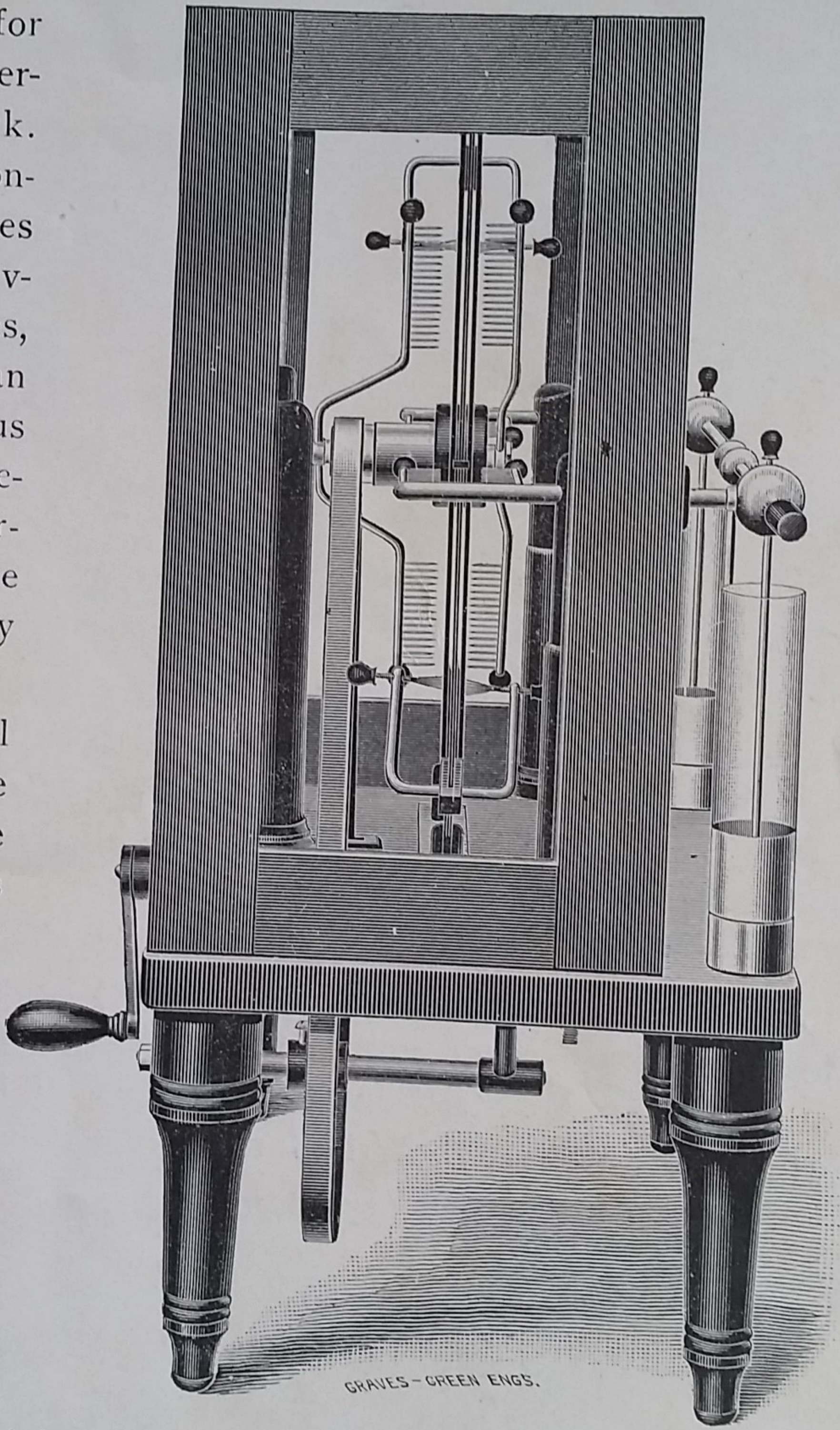
Immediate shipment guaranteed.

STATIC MACHINES.

The cabinet work on our machines may be either mahogany or oak, and is designed for strength and neatness Every machine, unless especially ordered to the contrary, is provided with a case of wood and glass which insulates the generating parts from the outside atmosphere. Access to the working parts is obtained through doors in each end of the case. To prevent electrical leakage all the metal and conducting parts are firmly fixed on hard rubber supports. The driving gear is so arranged that the operator may easily run the machine at its required speed of from 1,500 to 2,000 revolutions per minute. If desired, a special pulley for a motor will be attached without extra charge. The bearings are self-adjusting and self-lubricating and require no attention. For convenience of manipulation the discharge rods are placed on the outside of the case.



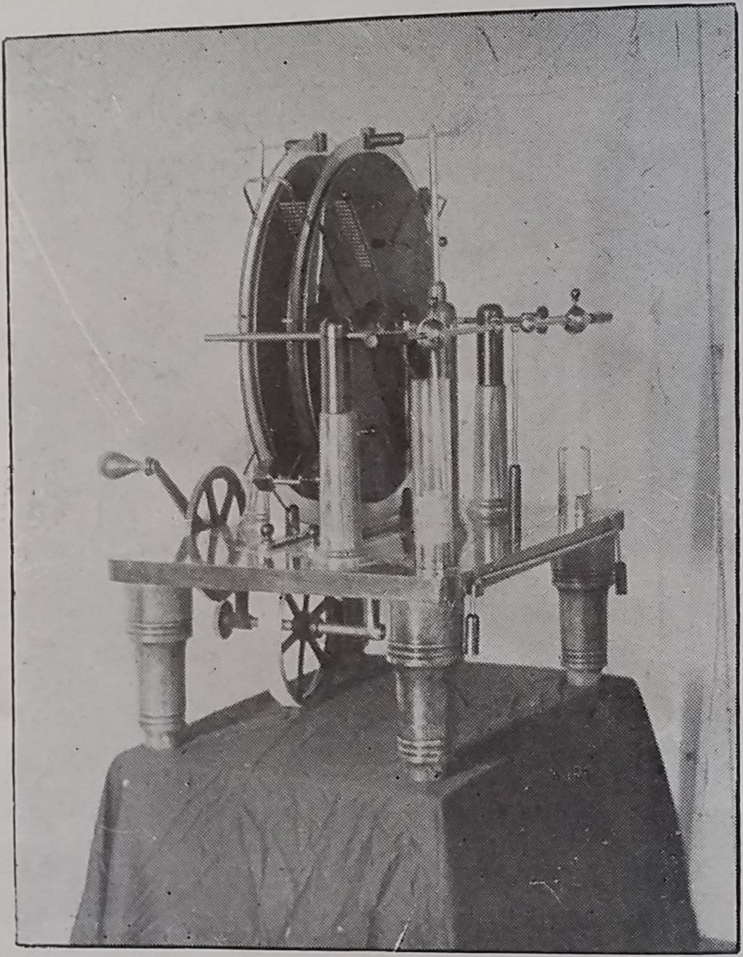
Our No. 1 machine has one stationary glass plate and one revolving rubber plate, will give a 4 or 5 inch spark, and is built for school and experimental work. It will show the bones of the hand or arm with the fluoroscope.



The No. 2 machine is especially adapted to the needs of the physician in general practice for X-ray and therapeutical work. It has two stationary glass plates and two revolving rubber plates, and will give an 8 inch continuous spark. It is useful in light therapeutical and the smaller X-ray work.

No. 2 Special is of the same capacity as the preceding, but is built more substantially, and is adapted to long continuous service of the hardest nature. In essentials, it is the same as No. 2, with the addition of an extra support for bearings, giving greater rigidity, special brushes, clips for Leyden jars and short-circuiting rods.

Our No. 3 machine has four stationary glass and four revolving rubber plates, will give an 8 inch spark of twice the volume of the No. 2, and is built for physicians and hospitals desiring a neat, compact, and powerful X-ray and therapeutical outfit. This machine has been growing in favor with the medical profession during the past year, as is attested by the numerous unsolicited testimonials which we have received. It may be run by hand, or, if preferred, from any source of power.



At present we are building a new line of static machines which will shortly be placed upon the market. They will embody all the latest improvements, including pole-changer, *air-tight* case, anti-friction, self-adjusting, oilless bearings, and belt-tightening device, all so arranged that in the operation of the machine it will never be necessary to open the case or expose the working parts to the outside atmosphere. A special supplement devoted to these machines will be issued shortly. Write for it.

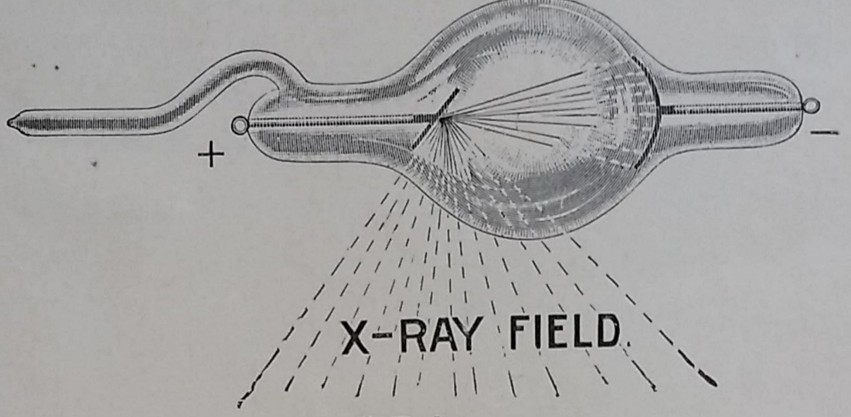
NET PRICE LIST.

No. I	$30.00
" 2	45.00
" 2 Special	60.00
" 3	95.00
" 3 (with pole-changer)	100.00

For prices of complete outfits see page 11.

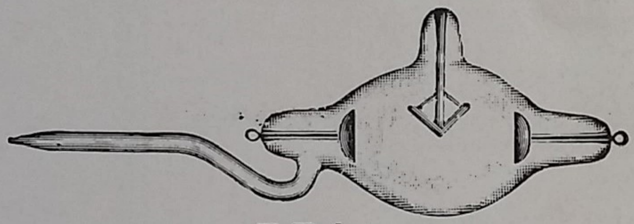
TUBES.

We feel justly proud of the way our tubes have stood the hard and exacting tests to which they have been submitted in the past few years.

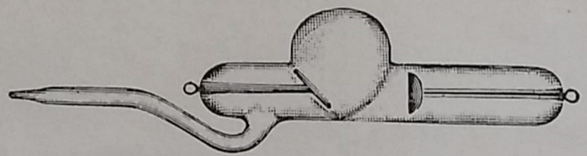


S Tube.

Too much care cannot be exercised in fitting a tube to a special machine. We make tubes for all kinds and sizes of generators and carry in stock all the ordinary styles. In placing an order for a tube, it is absolutely necessary to specify the kind of machine and the spark length upon which it is to be run in order that you may receive a tube of the correct style and vacuum. If you have any special idea that you wish embodied in a tube, send us the specifications and we will make it for you.



T Tube.



B Tube.

PRICE LIST.

Type S, for small static machines . . .	$ 5.00
,, W, ,, medium ,, ,, . . .	6.75
,, M, ,, largest ,, ,, . . .	8.00
,, R, ,, large coils	7.50
,, B, ,, coils 6 ins. or less	5.00
,, T, ,, Tesla coils	7.50
,, T, ,, large size, adjustable vacuum .	10.00

Type W may also be used for coils.

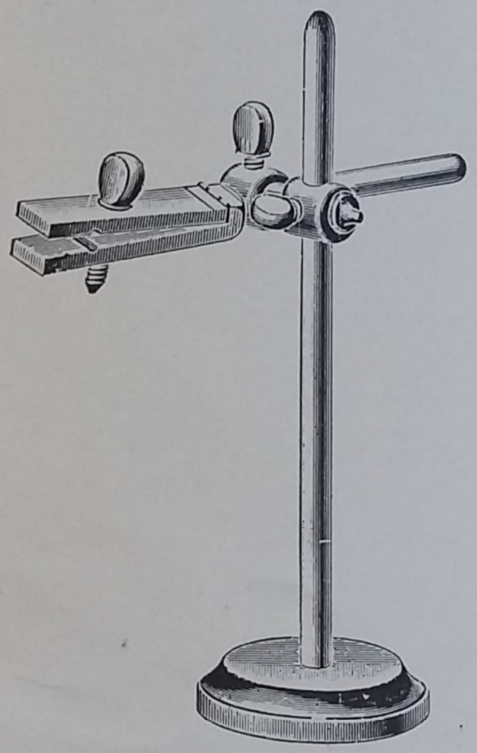
Vacuum regulator, $2.00 extra. Repumping: S and B, $1.00; W and T, $1.50; M and R, $2.00. Repairing at reasonable prices.

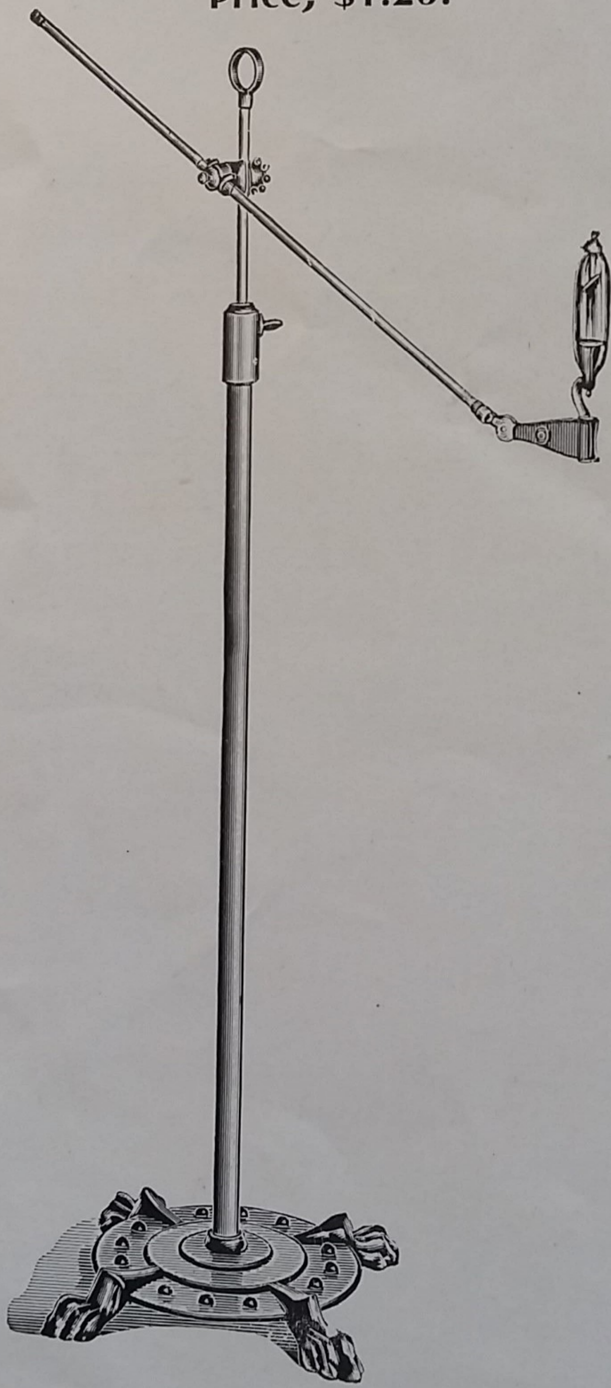
We make a specialty of repairing and repumping other makes of tubes. We will not hold ourselves responsible for the breaking of tubes undergoing repairs. Our new special static tube is superior in definition, brilliancy, and life. Prices same as for regular S and W. When ordering, specify *Special S* or *Special W*.

TUBE STANDS.

Our small tube stands are made of highly polished maple, cork jaws, triple swing, giving any possible angle, and are weighted with lead to hold the tube steady.

Price, $1.25.



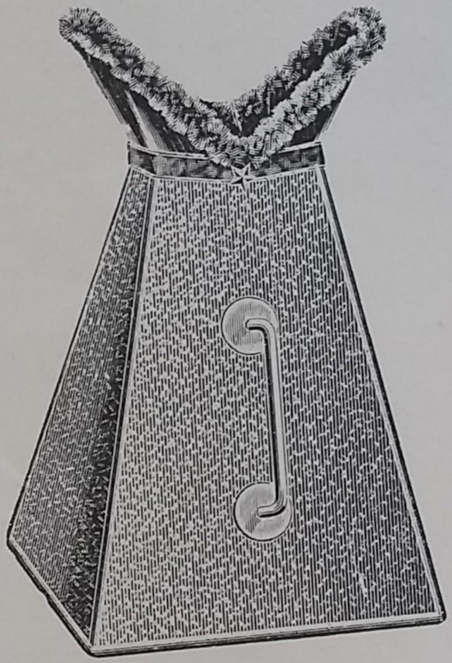


Our floor stand is particularly adapted for use in hospitals, or places where a large range of position for the tube is necessary. This stand is made of iron with a fiber arm, cork jaws for the tube, insulators for holding wires at least 16 inches apart, and will hold the tube in any position from 1 to 9 feet from the floor.

Price, $10.00.

FLUOROSCOPES.

There are two different kinds of fluoroscopes, the tungstate of calcium and the platinum barium cyanide. The advantages of the tungstate are its long life and comparatively low price. Our tungstate screens are made from the best crystals obtainable, in a thorough and workmanlike manner, and are unsurpassed.



Our barium screens are manufactured by a new process, which insures a much longer life for them than heretofore, and are a triumph of brilliancy, definition, and wearing quality. The barium screen is fully 75 per cent. clearer than the tungstate, and the increased cost will be money well spent to any one who uses the X-ray any appreciable amount.

PRICE LIST.

Calcium Tungstate.

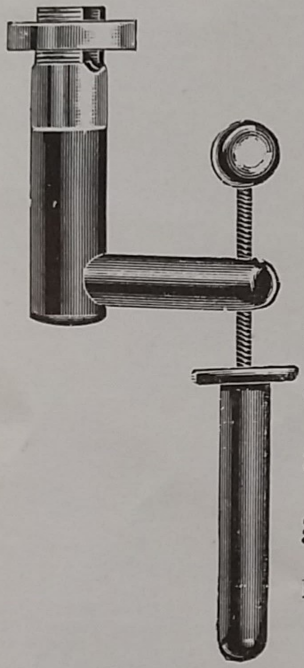
4 x 5	$5.00
5 x 5	6.00
5 x 7	9.00
6 x 6	9.00
6 x 8	11.00
8 x 10	16.00

Platinum Barium Cyanide.

4 x 5	$8.00
5 x 5	10.00
5 x 7	12.50
6 x 6	13.00
6 x 8	16.00
8 x 10	24.00

Unmounted tungstate calcium screens, 15 cents per square inch.

SPARK GAPS.



It is an established fact that for X-ray work a double spark gap, *i. e.*, a gap at each pole, is very much better than the old method of a single gap. To make this feasible, we manufacture these spark gaps.

They are made of brass and rubber, so arranged that they may be clamped to the discharge rods, and the length of gap regulated by a screw. These, or the pole-changer with double gap listed below, should be used on all static machines intended for X-ray work.

Price, $3.00 per pair.

POLE-CHANGER.

By request of a number of our friends, we have designed a combined *pole-changer and double spark gap*. This may be attached to any static machine in five minutes' time with only the aid of a screwdriver.

By its use the tube may be instantly reversed without disturbing the spark-gap adjustment or connections. This appliance is neat in appearance, simple, and positive in action. In ordering state size, style, and finish of the machine it is to be used on.

Price, $8.00.

Pole-changers for machines of other makes made to order. Price on application.

SAMPLE OUTFITS.

Outfit A.

One No. 2 machine, including case	$45.00
,, tube, type S	5.00
,, extra tube, type S	5.00
,, tube stand	1.25
,, tungstate of calcium fluoroscope, 6 x 6	9.00
	$65.25

Outfit E.

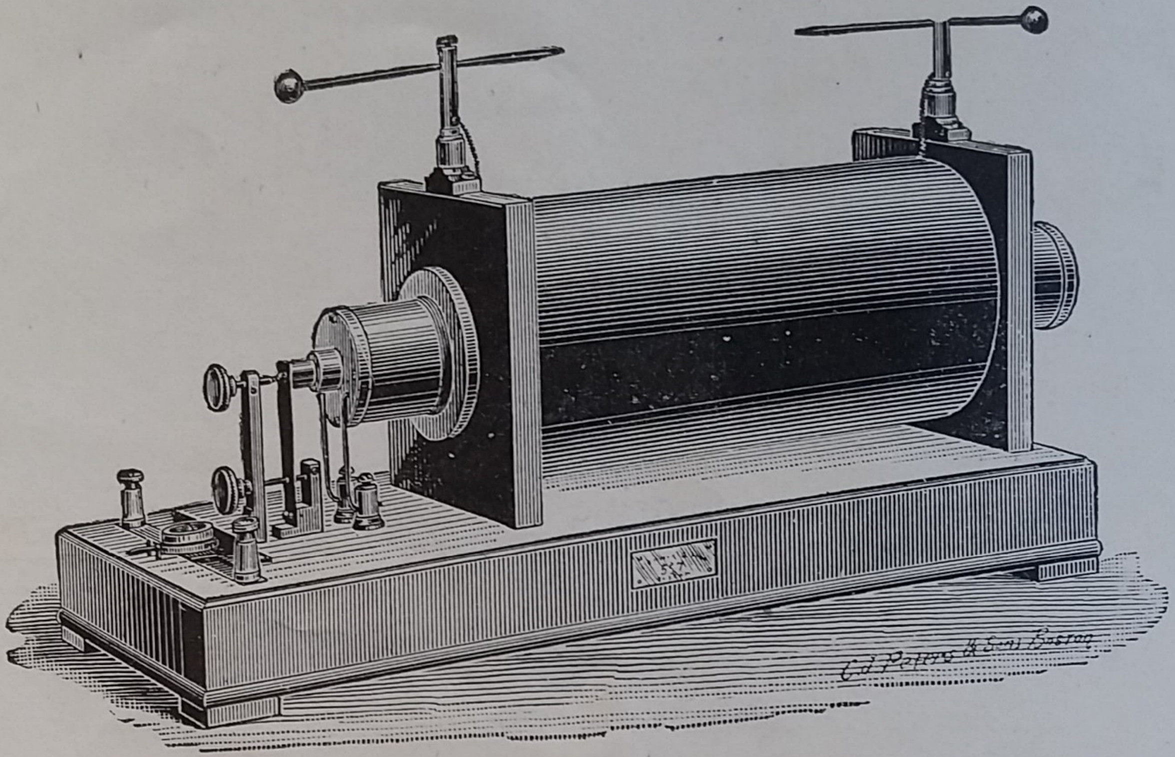
For experimental and school work.

One No. 1 machine	$30.00
,, tube, type S	5.00
,, tube stand	1.25
,, fluoroscope, 5 x 5	6.00
	$42.25

Outfit G.

One No. 3 machine, including case and pole-changer	$100.00
,, tube, type S, with adjustable vacuum	7.00
,, ,, ,, S	5.00
,, ,, stand	1.25
,, tungstate of calcium fluoroscope, 6 x 8	11.00
	$124.25

We recommend the addition of a pole-changer or a pair of spark gaps to each of the above outfits. Price: pole-changer, $8.00; spark gaps $3.00.



Outfit D.

We would advise this outfit where from lack of room or other local reasons a static machine could not be used.

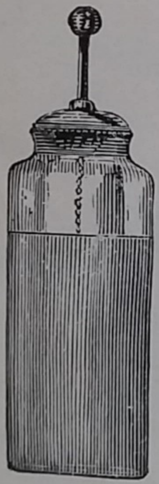
One 8 in. Ruhmkorff coil	$115.00
,, tube, type W	6 75
,, ,, ,, R	7.50
,, ,, stand	1.25
,, fluoroscope, 6 x 8	11.00
Four cells storage battery, 100 ampere-hours	50.00
	$191.50

Prices on other sizes of coils and special catalogue on application. These coils are made expressly for us by one of the oldest coil makers in the country, and we do not hesitate to warrant them the best thing obtainable in the coil line.

Platinum fluoroscopes may be substituted for tungstate in any of the above outfits for difference in price. See page 9 for prices.

EXTRA PARTS.

Glass plates, each	$2.00
Rubber plates, each (subject to change with market price of rubber)	3.50
Leyden jars, each	.35
Wooden covers for Leyden jars, per pair	.50
Brass rod used to short-circuit machine so that connection to the tube may be changed while the machine is generating	1.00
Fused chloride of calcium, per lb.	.40
" " " " 10 lb. can	1.50
Pulley for attaching motor	1.00
Special stretched rawhide belts, each	.50
Belt needle, with waxed ends	.10
Brushes, each	.15
Cords with special hook tips for connecting tubes to machine, 5 foot, 50 cents; 10 foot	.75



When ordering parts, give serial number, which you will find on base of machine, behind gear wheel, and also on door of machine.

We make a specialty of furnishing parts of static machines and apparatus to experimenters or others who wish to build for themselves. Prices on application.

MOTORS.

Having so many inquiries for motors to run our machines, we list below the different styles and sizes in common use.

1/6 horse-power motor, 110 volt direct current for No. 2 machine	$25.00
1/6 horse-power motor, 104 or 52 volt alternating for No. 2 machine	60.00
1/4 horse-power motor, 110 volt direct for No. 3 machine	55.00
1/4 horse-power motor, 104 or 52 volt alternating for No. 3 machine	90.00
1/4 horse-power 500 volt direct current for No. 3 machine	60.00
Water motor for No. 2 machine, pressure of 80 lbs. to square inch, or over	15.00
Water motor for No. 2 machine, pressure under 80 lbs. to square inch	22.50
Water motor for No. 3 machine, pressure of 80 lbs. or over per square inch	22.50

In ordering motors, if electric, state voltage of the current, and if alternating, the frequency of alternations; if water motors, the water pressure per square inch and size of your supply pipe.

CARBUTT PLATES FOR X-RAY WORK.

These plates are individually wrapped in light-proof wrappers so that they may be used under the X-rays without any further preparation.

Size.	Per Dozen.	Size.	Per Dozen.
5 x 7	$1.30	11 x 14	$ 6.00
6½ x 8½	2.00	14 x 17	11.65
8 x 10	2 90		
10 x 12	4.50		

DEVELOPING AND PRINTING OUTFIT.

Two 8 x 10 developing trays	$2.20
One 8 x 10 printing frame	.75
" 3 oz. bottle rodinal	.60
" red lantern	1.00
" pound hypo	.10
	$4.65

Complete outfit with full instructions for use shipped immediately on receipt of order.

FLUOROMETER.

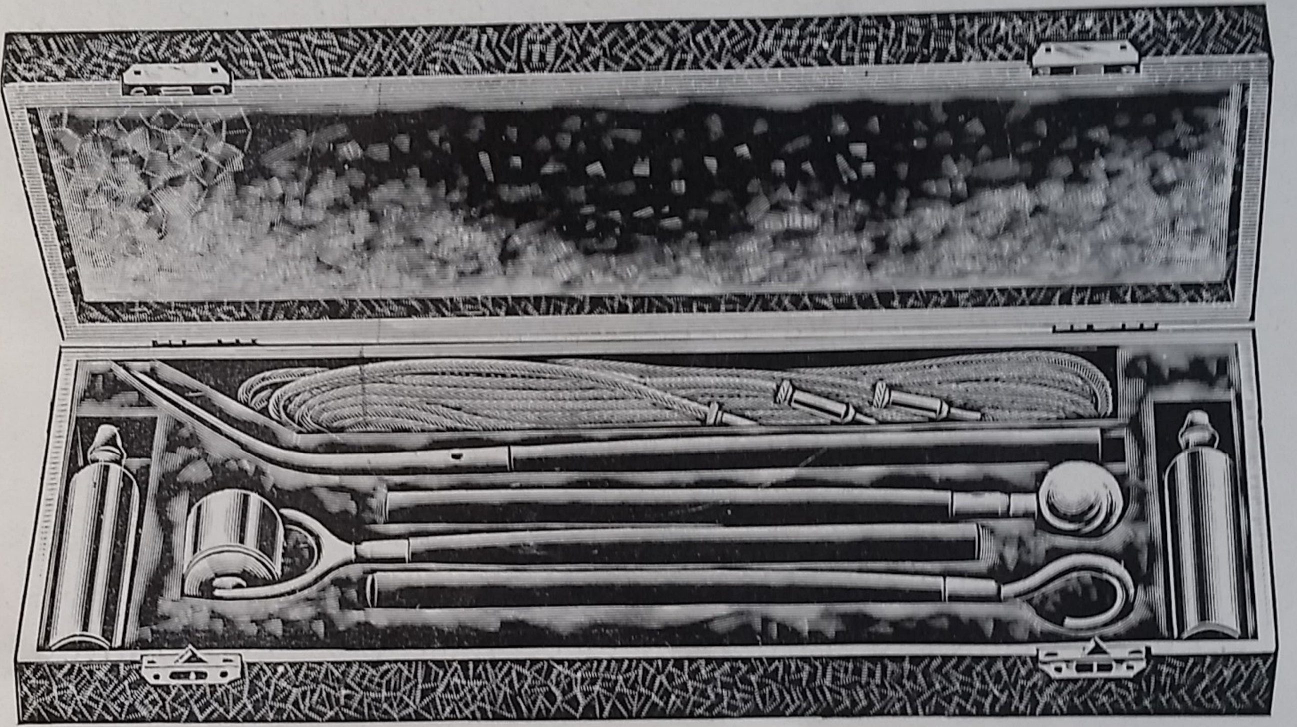
For use in hospitals, or in other places, where a very large number of accident cases are brought to be radiographed, a positive means of locating foreign substances is a great help both as to time and results. Such an apparatus is the Dennis fluorometer. Fuller details and special catalogue of this valuable adjunct to X-ray work on application.

Price, $150.00.

STATIC ELECTRODES.

Crown	$2.50
Point	1.00
Insulating handle	.50
Ball	1.00
Roller	1.50

Morton interrupting handle	$5.00
Insulating stool	6.00
Floor stand, with ball, crown, and point, complete . . .	10.00
Static cords, per pair	.60



The above case contains one pair static cords with handles, one point, one roller, one insulating hook, and one ball, in plush-lined leather case.

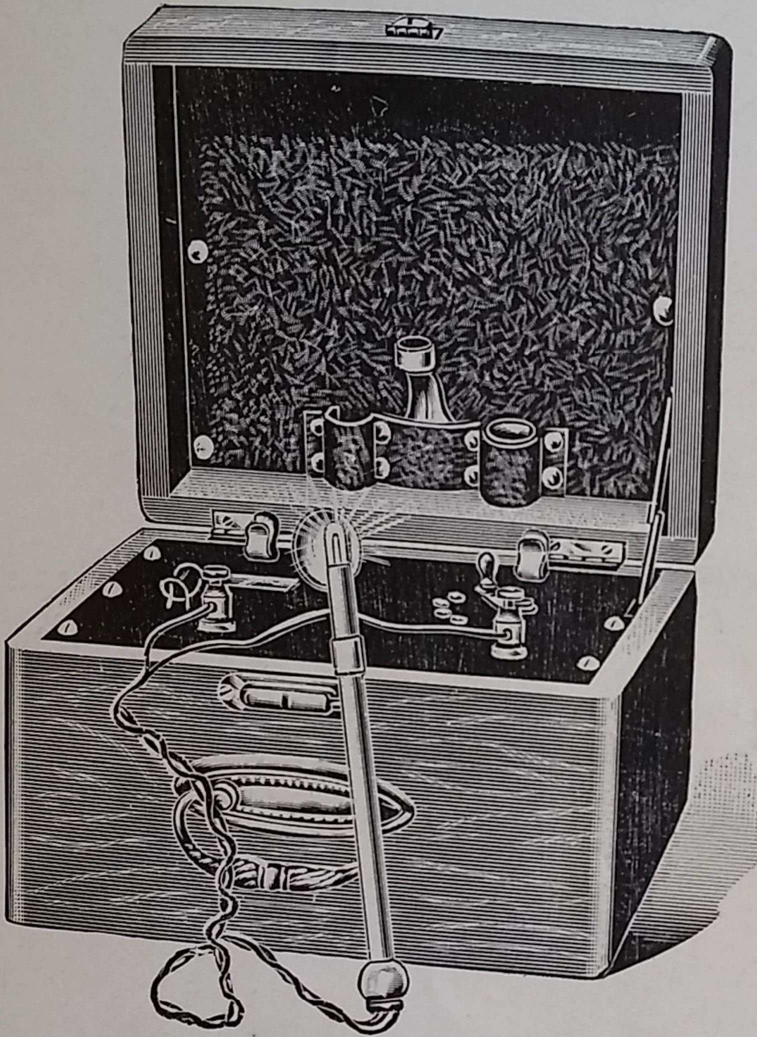
Price, $6.50.

OZONE INHALER.

The therapeutic value of ozone is coming to be more and more generally recognized by the medical fraternity. To meet this want we make a neat appliance which may be used on any static machine. It consists of a glass bulb, with the proper terminals enclosed, firmly arranged on a polished turned wooden base.

Price, $6.00.

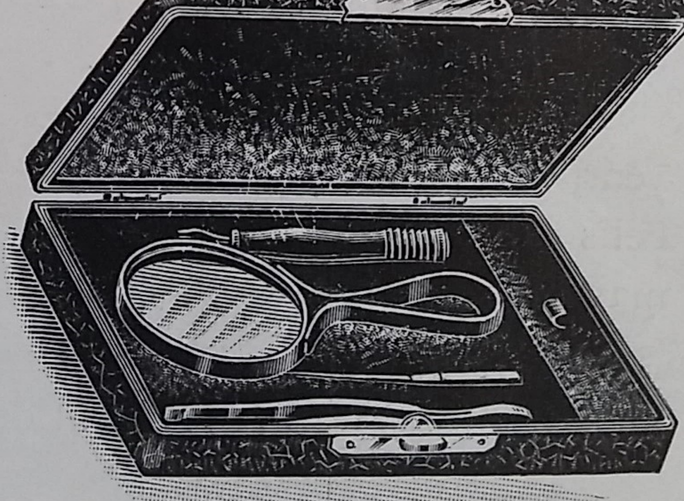
PORTABLE LIGHT SET.



Recognizing the value to the physician of some little instrument for illuminating the interior parts, we have designed and built a neat and portable light set. The lamp used is of two candle power. Three silver-plated reflectors are furnished. The electricity is generated by three dry cells and the current is controlled by a simple rheostat. The case is finished in mahogany, all metal parts nickel plated and fitted with a neat drop handle and catch.

Price complete, $15.00.

EPILATION SET.



Having had many calls for a serviceable outfit that will permanently remove superfluous hair, we have designed and placed on the market a neat, compact, and thoroughly reliable set for that purpose. Eight cells of dry battery put up in a highly polished quartered oak case, with switch, rheostat, binding posts, cords, and sponges. We use the latest improved dry cells with this outfit as well as the preceding, because they combine the advantages of portability, freedom from odor, and cleanliness, together with large output. The epilation case contains six steel needles, two iridio-platinum needles, needle holder, magnifying glass, and forceps. The lamp and reflectors used in the light set, also a small cautery knife, may be used with this battery. With the addition of the proper needles, this set may be used for the removal of naevi, birth marks, etc. Ample provision is made in the box for carrying these accessories. Wet battery may be substituted without additional cost.

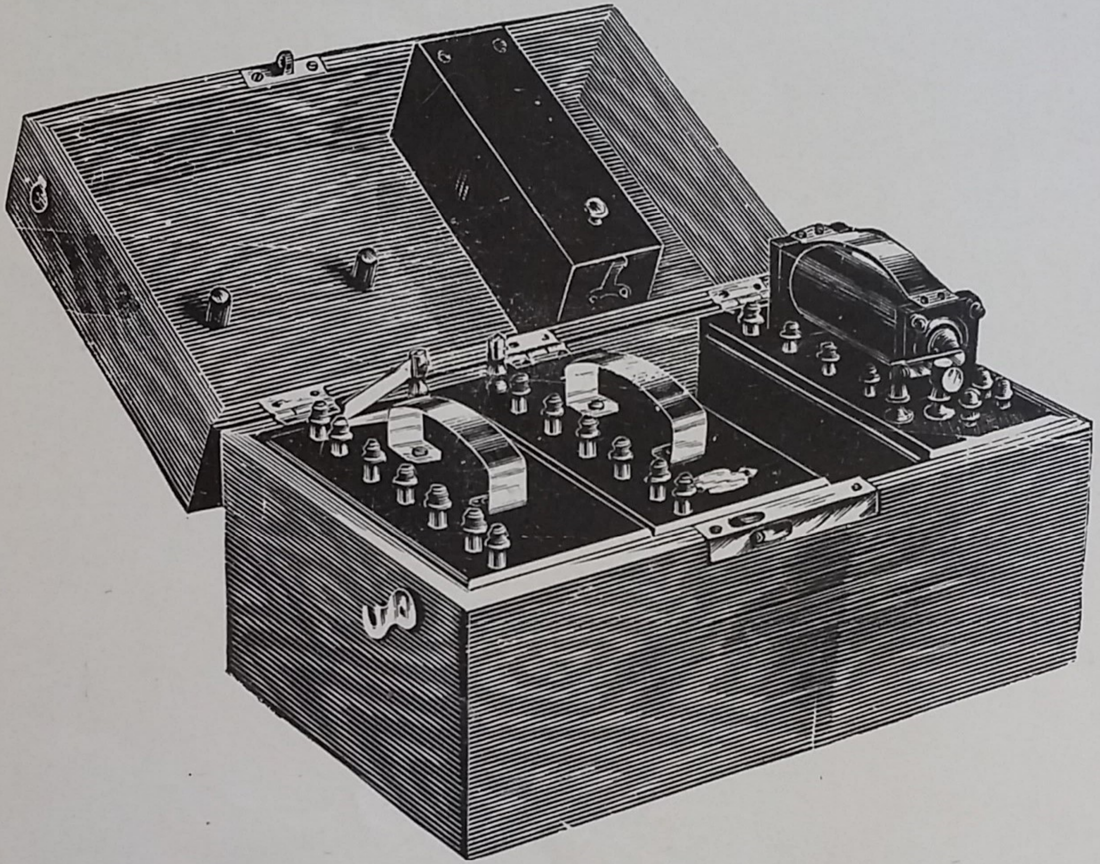
PRICE LIST.

Box, switchboard, battery, etc.	$15.00
Epilation case	3.25
Epilation set (complete)	18.00
Needle case (naevi, birth marks, etc.)	3.50
Small lamp with handle and reflector cord and socket .	3.75
Cautery knives, each	.75
Lamp only	.80
Replacing battery cells	2.40
Cords (per pair)	.50
Sponges (per pair)	.75
Handles (per pair)	.60
Complete outfit (box, epilation case, needle case, lamp, cautery knife, cords, and sponges)	25.00

The cells used in this battery should last from six months to a year, according to use. When it is necessary to renew them, the cells can be procured and connected by the purchaser, or the box may be sent to us, express prepaid, and we will attend to it.

Prompt attention given to any special design of battery. Price quoted on receipt of specifications.

WET CELL GALVANIC AND FARADIC BATTERIES.



6 cell galvanic	$12.00
12 cell galvanic	18.00
12 cell galvanic and faradic	24.00
18 cell galvanic	24.00
18 cell galvanic and faradic	30.00
Battery solution, per pint	.25
Bichromate of potash, per pound	.25

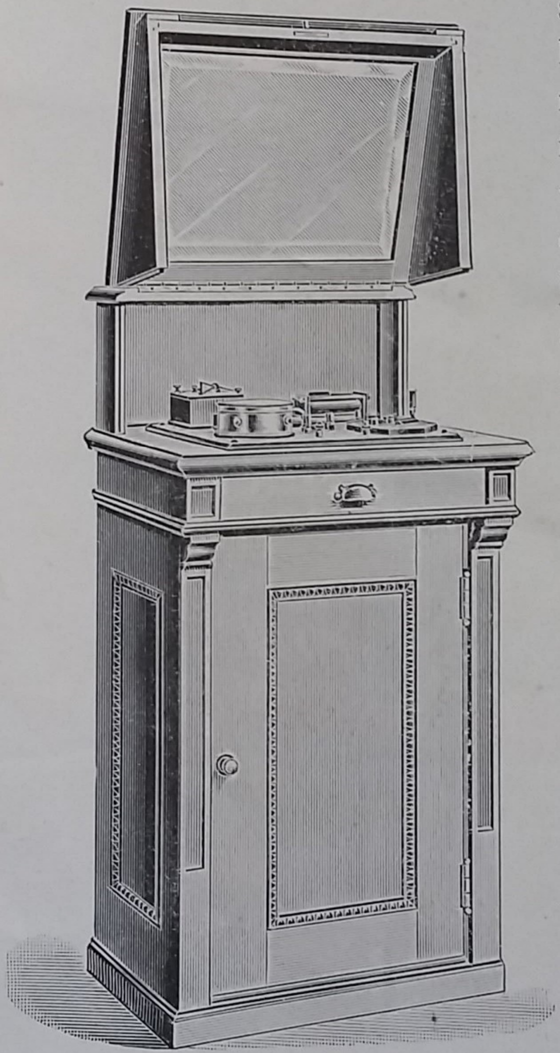
Repairing on all makes and sizes of galvanic or faradic goods on short notice and at reasonable prices.

GALVANIC AND FARADIC CABINETS.

NO. 1 CABINET.

This cabinet has room for 42 cells of sal-ammoniac battery, a switchboard containing cell selector, wire rheostat, adjustable rheotome for both galvanic and faradic currents, faradic coil with adjustable vibrator, pole-changer, milliamperemeter, binding posts, and necessary switches, together with drawers for electrodes.

Price, without cells, $80.00.



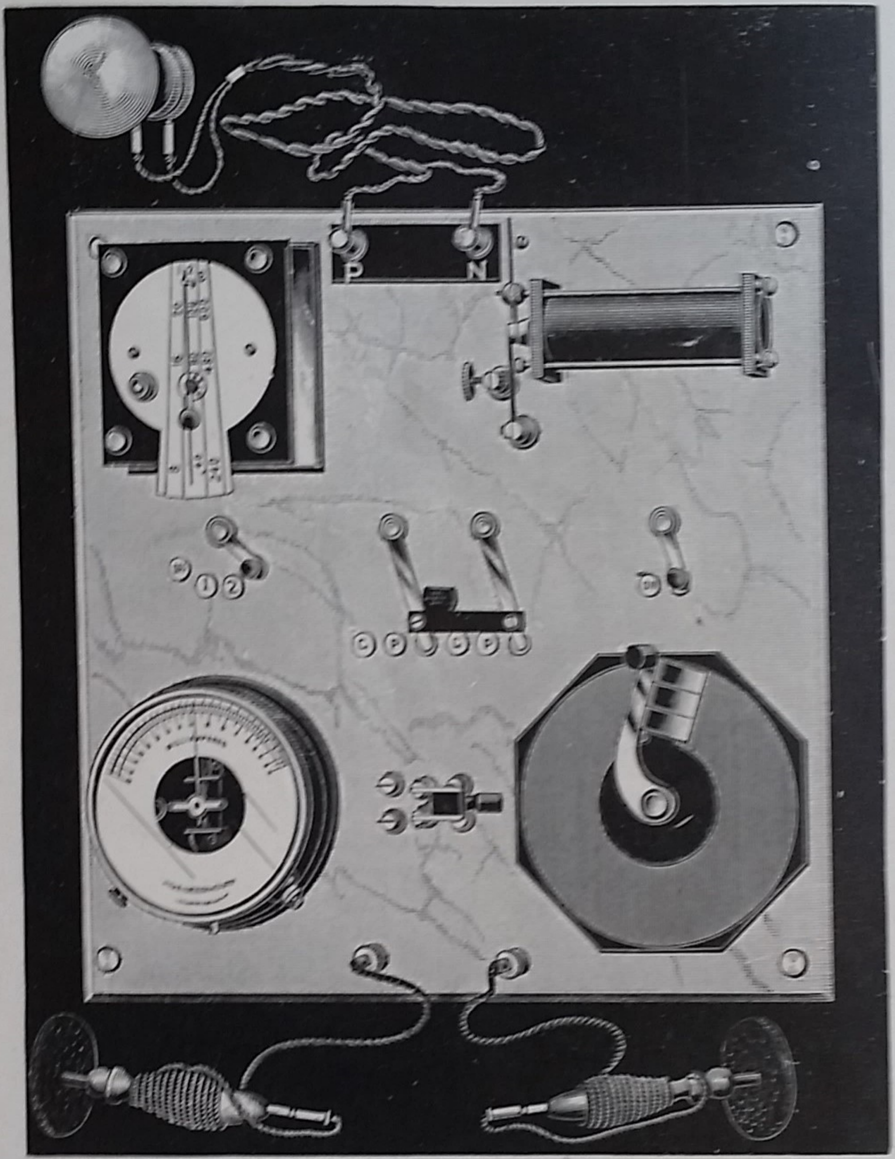
NO. 6 CABINET.

Illustrated.

The No. 6 cabinet is arranged for either the 110 volt direct current taken from the street main, or for 40 cells of primary battery. The marble plate has on it a milliamperemeter, graphite rheostat, faradic coil, adjustable rheotome for either galvanic or faradic currents, pole-changer, and the necessary switches and binding posts.

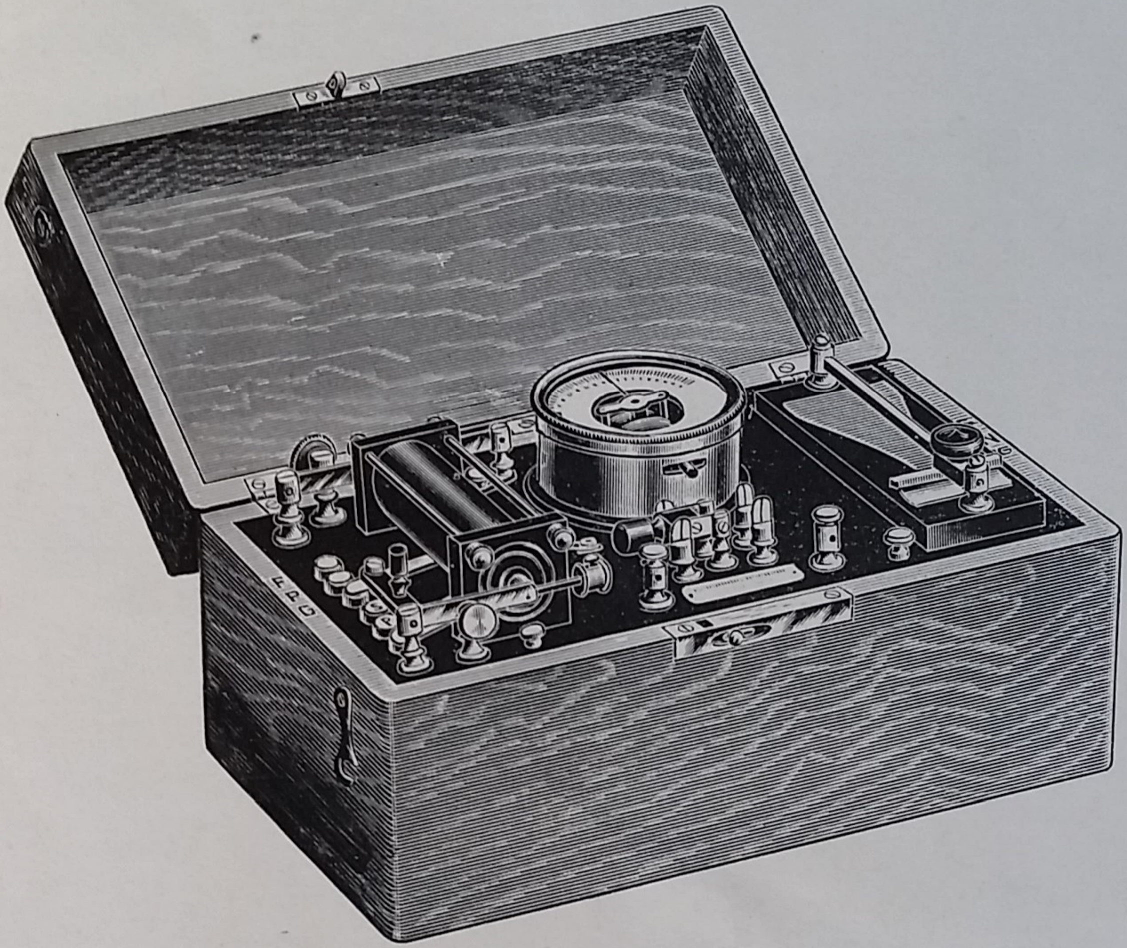
Price, without cells, $93.00.

With 43 special Swett & Lewis cells, $110.00.



No. 6 plate wired for 110 volt circuit.

Price, $60.00.



In some cases a portable galvanic battery is a valuable adjunct to the physician's equipment. This 40 cell (dry) galvanic and faradic outfit is 14½ inches long, 8¼ inches wide, and 7½ inches high, weighs 24 pounds, and is fitted with a special faradic coil having two vibrators, giving the fullest possible range of faradism, milliamperemeter, and graphite rheostat.

Price, including cords, handles, and sponges, $50.00.

Renewing cells, $8.00.

Prices and description of other styles and sizes of cabinets on application.

GALVANIC AND FARADIC PARTS AND SUPPLIES.

We list below a few of the galvanic and faradic accessories which we carry in stock:

Milliamperemeter	$15.00
Milliamperemeter (galvanometer form)	10.00
Graphite rheostat	7.50
Graduated automatic rheotome (for either galvanic or faradic)	12.00
Cautery set and knives (including handles and ecraseur loop)	12.00
General electrode case	9.00
Head lamp, aluminum parabolic reflector, with cords	9.00
Cords (per pair)	.75
Faradic batteries	$5.00, $7.50, $9.00, $18.00

We can furnish at a few days' notice any style of electrode manufactured and at market prices.

CELLS.

The best dry cells made at 40 cents apiece; lots of six or over, 35 cents apiece. The Swett & Lewis wet cell (for all open circuit work where long life and reliability are desired), 45 cents apiece; lots of six or over, 40 cents apiece.

Special wet cell (large zinc surface for use where large amperage is imperative), $1.25 each; lots of six or over, $1.10; lot of 40 or more, $1.00 each.

For all portable batteries of any kind we would recommend the use of dry cells, as their light weight and freedom from leakage and odor make them superior for transportation. For office work the Swett & Lewis sal-ammoniac cell is more efficient. Special description of these cells on application. For large cautery work we recommend a storage battery and primary cells, or, if the alternating current from the street mains is available, a transformer may be used.

Price, complete set, including two cells, storage battery, set of primary battery, and cautery set, described on page 23	$44.00
Transformer, for use on 104 or 52 volt, alternating current	20.00

ELECTRIC HAND LAMP.

For the physician and others, a pocket electric searchlight. Handy in every case where a powerful light of short duration is needed. This lamp is operated by three cells of dry battery, and will last a long time. When the cells become exhausted a new charge should be inserted.

Price, $3.00. Charges, 30 Cents.
By Mail, $3.30. By Mail, 50 Cents.
Larger size, batteries guaranteed for ten hours' use, $3.50.
By Mail, $4.00.

BOOKS.

Monell's Manual of Static Electricity in X-Ray and Therapeutical Uses	$6.00
Morton on the X-Ray. Paper, 50 cents; cloth	.75
Meadowcraft. A B C of the X-Ray. Cloth	.75
Atkinson's Static Electricity	1.50
Removal of Superfluous Hair and Other Blemishes by Electricity	1.00
Haynes' Elementary Principles of Electro-Therapeutics .	1.50

The Barta Press, Boston.

Know all Men by these Presents,

That I, Arthur W. French of Brookline in the County of Norfolk and Commonwealth of Massachusetts

IN CONSIDERATION OF One dollar and other valuable considerations

paid by Thomas B. Kinraide of Boston in the County of Suffolk and said Commonwealth

the receipt whereof is hereby acknowledged, do hereby remise, release, and forever QUITCLAIM unto the said Thomas B. Kinraide, his heirs and assigns forever, a certain parcel of land with the buildings thereon, situated in Sandwich in the County of Barnstable in said Commonwealth, in that part of said Sandwich called South Sandwich, on the northerly side of Spectacle Pond, so called, bounded and described as follows: viz:- Commencing at the easterly corner of said premises, by said Pond and the fence: thence northerly by said fence and land formerly of Saul Jones estate to the woodland now or formerly of Russell Holways heirs; thence northwesterly by said land of Holways heirs as the fence now stands to Hezekiah's Bars, so called; thence westerly by the fence to woodland of William Hamblins heirs; thence south-easterly by said heirs' land, as the fence now stands to the Pond; thence by said Pond to the point of beginning, containing sixty four acres more or less.

Being the same premises conveyed to me by The Reading Cooperative Bank by deed dated May 6, 1905, recorded with Barnstable Deeds, Book 270 Page 40 and they are hereby conveyed subject to the taxes for the current year.

TO HAVE AND TO HOLD the granted premises with all the privileges and appurtenances thereto belonging to the said Thomas B. Kinraide and his Heirs and Assigns to their own use and behoof forever.

And I do hereby, for myself and my Heirs, Executors, and Administrators, covenant with the said grantee and his Heirs, and Assigns, that the granted premises are free from all incumbrances made or suffered by me except as aforesaid

NOT A TRUE COPY

and that I will, and my Heirs, Executors, and Administrators shall, WARRANT AND DEFEND the same to the said grantee and his Heirs and Assigns forever against the lawful claims and demands of all persons claiming by, through, or under me except as aforesaid, but against none other current year.

TO HAVE AND TO HOLD the granted premises with all the privileges and appurtenances thereto belonging to the said Thomas B. Kinraide and his Heirs and Assigns to their own use and behoof forever.

And I do hereby, for myself and my Heirs, Executors, and Administrators, covenant with the said grantee and his Heirs, and Assigns, that the granted premises are free from all incumbrances made or suffered by me except as aforesaid

NOT A TRUE COPY

and that I will, and my Heirs, Executors, and Administrators shall, WARRANT AND DEFEND the same to the said grantee and his Heirs and Assigns forever against the lawful claims and demands of all persons claiming by, through, or under me, except as aforesaid but against none other.

And for the consideration aforesaid I Addie P. French wife of said Arthur P. French

do hereby release unto the said grantee and his Heirs and Assigns all right of or to both DOWER and HOMESTEAD in the granted premises, and all other right and interest therein.

IN WITNESS WHEREOF we the said Arthur P. French

and

Addie P. French

hereunto set our hands and seals this twenty seventh day of July

in the year One Thousand Nine Hundred and five,

Signed, Sealed and Delivered, in presence of

C. W. Smith

Arthur P. French (L.S.)
Addie P. French (L.S.)

COMMONWEALTH OF MASSACHUSETTS.

Suffolk ss.

July 27th 1905

Then personally appeared the above-named Arthur P. French and acknowledged the foregoing instrument to be his free act and deed; before me,

C. W. Smith JUSTICE OF THE PEACE.

BARNSTABLE, ss. Received July 28 1905, and is recorded and compared.

ATTEST, [illegible] F. Sherman REGISTER.

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Know all men by these presents,

That I Henry H. Gray of Barnstable, County of Barnstable, Commonwealth of Massachusetts

IN CONSIDERATION OF One Dollar and other valuable considerations paid by Thomas B. Kinraide of Jamaica Plains, Mass.

the receipt whereof is hereby acknowledged, do hereby give, grant, bargain, sell, and convey unto the said Thomas B. Kinraide a certain lot of land situated in Sandwich, bounded and described as follows:- On the South by land now or formerly of John Sanders, and on the West, North and East by land now or formerly of Henry M. Pinkham. The above land being fully described by a plot annexed to deed from Abraham Hoxie to Eli Hinckley dated September 28 A.D. 1859, recorded in the Barnstable County records, Book 72, page 244. I also grant to said Kinraide, his heirs and assigns all the privileges I have of passing to and from the same. Being the same premises conveyed to me as Henry Gray by Andrew Lawrence by deed dated July 1, 1885 and recorded with Barnstable Deeds Libro 162 folio 416.

TO HAVE AND TO HOLD the granted premises with all the privileges and appurtenances thereto belonging to the said Thomas B. Kinraide ~~grantee~~ and his Heirs and Assigns to their own use and behoof forever.

And I hereby for my self and my Heirs, Executors and Administrators, covenant with the ~~said~~ grantee and his Heirs and Assigns, that I am lawfully seized in fee simple of the granted premises, that they are free from all incumbrances

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That I have good right to sell and convey the same as aforesaid and that I will, and my Heirs, Executors, and Administrators shall WARRANT AND DEFEND the same to the said grantee and his

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TO HAVE AND TO HOLD the granted premises with all the privileges and appurtenances thereto belonging to the said Thomas B. Kinraide ~~grantee~~ and his Heirs and Assigns to their own use and behoof forever.

And I hereby for myself and my Heirs, Executors and Administrators, covenant with the ~~said~~ grantee and his Heirs and Assigns, that I am lawfully seized in fee simple of the granted premises, that they are free from all incumbrances

That I have good right to sell and convey the same as aforesaid and that I will, and my Heirs, Executors, and Administrators shall WARRANT AND DEFEND the same to the ~~said~~ grantee and his Heirs and Assigns forever against the lawful claims and demands of all persons.

And for the consideration aforesaid I Carrie Gray wife of Henry H. Gray

~~do~~ hereby release unto the ~~said~~ grantee and his Heirs and Assigns all right of or to both DOWER and HOMESTEAD in the granted premises, and all other rights and interests therein.

IN WITNESS WHEREOF we the said Henry H. Gray and Carrie Gray

~~have~~ hereunto set our hand and seal this 22nd day of October in the year One Thousand Nine Hundred and nine.

Signed and Sealed, ~~and Delivered~~, in presence of
J. H. Burrell

Henry H. Gray (L.S.)
Carrie Gray (L.S.)

COMMONWEALTH OF MASSACHUSETTS.

Barnstable ss.

January 28th 1910

Then personally appeared the above-named Henry H. Gray and acknowledged the foregoing instrument to be his free act and deed; before me,

Chas. H. Moore JUSTICE OF THE PEACE.

BARNSTABLE, SS. Received March 11 1910, and is recorded and compared.

KNOW ALL MEN BY THESE PRESENTS

that we John A. Armstrong and Robert F. Armstrong of Sandwich County of Barnstable in the Commonwealth of Massachusetts, Trustees under the last will of Robert Armstrong late of Sandwich in the County of Barnstable and Commonwealth aforesaid, deceased, which will was duly proved and allowed by the Probate Court for said County on the fourteenth day of June A.D. 1910 we, do by virtue and in execution of the power to us given in and by said will, and of every other power and authority __ hereto enabling, and in consideration of the sum of two hundred and fifty 00/100 dollars to us paid by Thomas B. Kinraide of Sandwich County of Barnstable and Commonwealth of Massachusetts the receipt whereof is hereby acknowledged, hereby grant, bargain, sell, and convey unto the said Thomas B. Kinraide a certain piece or parcel of woodland situated in the easterly part part of the town of Sandwich and the same is further bounded and described as follows viz:- Beginning at the Northeast corner of the said woodlot at a heap of stones and running northwesterly by land now or formerly owned by Joseph Hoxie and Samuel Nye by a line of marked trees and heaps of stones to the Mill road (so called) thence southwesterly by said Mill road about fifteen (15) rods to a heap of stones, thence Northwesterly by woodland now or formerly owned by Lemuel Freeman by a line of marked trees to woodland now or formerly owned by Joseph Wing, thence southwesterly by said Joseph Wing's land by a line of marked trees to woodland now or formerly owned by Hezekiah Hoxie, thence southeasterly by said H. Hoxie's woodland "by a line of marked trees" to a road thence Northeasterly by the Northerly branch of said Mill road to the Hay road (so called) to a stake and stones, thence southeasterly by said Hay road to land now or formerly owned by Hezekiah Hoxie Jr. thence Northeasterly by said H. Hoxie's Jr.'s woodland "by a line of marked

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fifteen (15) rods to a heap of stones, thence Northwesterly by woodland now or formerly owned by Lemuel Freeman by a line of marked trees to woodland now or formerly owned by Joseph Wing, thence southwesterly by said Joseph Wing's land by a line of marked trees to woodland now or formerly owned by Hezekiah Hoxie, thence southeasterly by said H. Hoxie's woodland "by a line of marked trees" to a road thence Northeasterly by the Northerly branch of said Mill road to the Hay road (so called) to a stake and stones, thence southeasterly by said Hay road to land now or formerly owned by Hezekiah Hoxie Jr. thence Northeasterly by said H. Hoxie's Jr.'s woodland "by a line of marked trees" to first mentioned bound containing twenty three (23) acres be the same more or less. It being the same property conveyed by Hezekiah Hoxie to Solomon Hoxie by deed dated July 4, 1834 and recorded in Barnstable County Registry of Deeds Book 12 Page 261. Also another parcel of woodland in said easterly part of Sandwich adjoining the above described woodland and is further bounded and described as follows viz:- Beginning at the northeast corner of the woodland at the crossing of the roads that leads from Hog pond (so called) to Nye's Mill and the Back road (so called) at a heap of stones, thence by the road southerly twenty (20) rods to a heap of stones which is the corner, thence westerly by woodland now or formerly owned by Hezekiah Hoxie by a line of marked trees and heap of stones sixteen (16) rods to a heap of stones that is the corner, thence northerly by said H. Hoxie's woodland until it comes to the Back road (so called) thence by said road until it comes to the first mentioned bounds containing two (2) acres be the same more or less being the same property conveyed by Hezekiah Hoxie to Solomon Hoxie by deed dated November 16, A.D. 1850 and recorded in Barnstable Registry of Deeds Book No. 47 Page 495TO HAVE AND TO HOLD the above-granted premises, with all the privileges and appurtenances thereto belonging, to the said Thomas B. Kinraide and his heirs and assigns, to their own use and behoof forever. IN WITNESS WHEREOF we the said John A. Armstrong and Robert

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F. Armstrong hereto set our hands and seals, this twenty second day of July in the year one thousand nine hundred and eleven.

Signed and sealed in presence of)
Fletcher Clark to both)

John A. Armstrong (LS)
Robert F. Armstrong (LS)
Executors of the Will of
Robert Armstrong

Commonwealth of Massachusetts.

Barnstable ss. July 22 1911 Then personally appeared the above-named John A. Armstrong and Robert F. Armstrong and acknowledged the foregoing instrument to be their free act and deed, before me,-

(LS) Fletcher Clark Notary Public

Barnstable ss. Received July 26, 1911, and is recorded.

KNOW ALL MEN BY THESE PRESENTS

that I, Ella Converse, of Dedham, in the County of Norfolk and Commonwealth of Massachusetts, in consideration of one dollar and other valuable consideration paid by Charles Whittemore, of Newton, in the County of Middlesex and said Commonwealth, the receipt whereof is hereby acknowledged, do hereby remise, release and forever quitclaim unto the said Charles Whittemore a certain lot of land in Quisset, in the town of Falmouth, in the County of Barnstable and said Commonwealth, bounded as follows, to wit:- Beginning at the south-east corner on the road from Falmouth to Woods Holl, by land now or late of John S. Blakie; thence running in a southerly direction 33-1/4° West, three hundred

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Know all men by these presents,

That I, Levi D. Hamblin of Sandwich, County of Barnstable and Commonwealth of Massachusetts

IN CONSIDERATION OF One dollar and other valuable considerations paid by Thomas B. Kinraide of the city of Boston, County of Suffolk, Commonwealth aforesaid

the receipt whereof is hereby acknowledged, do hereby remise, release, and forever QUITCLAIM unto the said Thomas B. Kinraide the lower road lot "so called" situated in the town of Sandwich, county of Barnstable and commonwealth of Massachusetts and further bounded and described as follows viz:- Northwesterly by woodland now or formerly of Clark Hoxie, Southerly by woodland now or formerly of Watson Freeman Estate, Easterly by woodland formerly of Henry Freeman, Northerly by woodland formerly of Barnabas Nye, Containing twelve (12) acres be the same more or less and is lot formerly owned by Lemuel Freeman and was conveyed to Nathan Freeman 2nd of Provincetown to the heirs of said Lemuel Freeman and at the death of Nathan Freeman 2d reverted to Nathan D. Freeman son of Nathan Freeman 2d and conveyed by James H. Nickerson Administrator of the estate of of Nathan D. Freeman to Levi D. Hamblin and recorded in Barnstable County Registry for deeds Book No. 313. page 274.

TO HAVE AND TO HOLD the granted premises with all the privileges and appurtenances thereto belonging to the said Thomas B. Kinraide and his Heirs and Assigns to their own use and behoof forever.

And I do hereby, for myself and my Heirs, Executors, and Administrators, covenant with the said grantee and his Heirs and Assigns that the granted premises are free from all incumbrances made or suffered by me

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and that I will, and my Heirs, Executors, and Administrators shall WARRANT AND DEFEND the same to the said grantee and his Heirs and Assigns forever against the lawful claims and demands of all persons claiming by, through, or under me but against none other.

TO HAVE AND TO HOLD the granted premises with all the privileges and appurtenances thereto belonging to the said Thomas B. Kinraide and his Heirs and Assigns to their own use and behoof forever.

And I do hereby, for myself and my Heirs, Executors, and Administrators, covenant with the said grantee and his Heirs and Assigns that the granted premises are free from all incumbrances made or suffered by me

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and that I will, and my Heirs, Executors, and Administrators shall WARRANT AND DEFEND the same to the said grantee and his Heirs and Assigns forever against the lawful claims and demands of all persons claiming by, through, or under me but against none other.

And for the consideration aforesaid I Annie F. Hamblin wife of Levi D. Hamblin

do hereby release unto the said grantee and his Heirs and Assigns all right of or to both DOWER and HOMESTEAD in the granted premises, and all other rights and interests therein.

IN WITNESS WHEREOF we the said Levi D. Hamblin and Annie F. Hamblin hereunto set our hands and seals this twentieth day of August in the year One Thousand Nine Hundred ~~and~~ twelve

Signed, and Sealed, ~~and Delivered,~~ in the presence of

Levi D. Hamblin (Ls)
Annie F. Hamblin (Ls)

COMMONWEALTH OF MASSACHUSETTS.

Barnstable ss.

August 20th 1912.

Then personally appeared the above-named Levi D. Hamblin and acknowledged the foregoing instrument to be his free act and deed; before me,

(Ls) Fletcher Clark ~~Justice of the Peace.~~ Notary Public

BARNSTABLE, ss. Received September 10 1912, and is recorded and compared

Know all men by these presents,

That I Jerome R. Holway of the town of Sandwich County of Barnstable Commonwealth of Massachusetts

IN CONSIDERATION OF One dollar and other valuable considerations

paid by Thomas B. Kinraide of Sandwich, County and Commonwealth aforesaid

the receipt whereof is hereby acknowledged, do hereby remise, release, and forever QUITCLAIM unto the said Thomas B. Kinraide a certain woodlot situated in the town of Sandwich containing about thirty acres more or less and being the same lot conveyed to Joseph G. Holway by Barnabas Holway by deed dated May 23rd 1854 and in said deed bounded as follows:- Southeasterly by the road running from Nye's Mill in East Sandwich to Snake Pond; Southwest by Abner Hoxie; northwest by Joseph Nye and northeast by Joshua Hall, Prince Holway Barnabas Holway Jr. and Hezekiah Hoxie" Also another piece of woodland situated in said Sandwich containing two acres more or less and being the same lot conveyed to Joseph G. Holway by Isaac Hoxie by deed dated April 29th 1868 and in said deed bounded as follows:- "Beginning at the Westerly corner at land of Micah Pinkham and the road leading from Sandwich town to Henry M. Pinkham; thence southeasterly by said Pinkhams land to Nye's Way (so called); thence northeasterly by said way to land of the said Joseph G. Holway (being lot No. 114) thence northwesterly by said Holway's land to land of Joseph Nye; thence southwesterly by said Nye land to first mentioned bounds be the distances more or less."

TO HAVE AND TO HOLD the granted premises with all the privileges and appurtenances thereto belonging to the said Thomas B. Kinraide and his Heirs and Assigns to their own use and behoof forever.

And I do hereby, for myself and my Heirs, Executors and Administrators, covenant with the said grantee and his Heirs and Assigns, that the granted premises are free from all incumbrances made or suffered by me

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and that I will, and my Heirs, Executors, and Administrators shall WARRANT AND DEFEND the same to the said grantee and his Heirs and Assigns forever against the lawful claims and demands of all persons claiming by, through,

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said Holway's land to land of Joseph Nye; thence southwesterly by said Nye land to first mentioned bounds be the distance more or less.

TO HAVE AND TO HOLD the granted premises with all the privileges and appurtenances thereto belonging to the said Thomas B. Kinraide and his Heirs and Assigns to their own use and behoof forever.

And I do hereby, for myself and my Heirs, Executors and Administrators, covenant with the said grantee and his Heirs and Assigns, that the granted premises are free from all incumbrances made or suffered by me

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and that I will, and my Heirs, Executors, and Administrators shall WARRANT AND DEFEND the same to the said grantee and his Heirs and Assigns forever against the lawful claims and demands of all persons claiming by, through, or under me but against none other.

And for the consideration aforesaid I Ella T. Holway wife of Jerome R. Holway

do hereby release unto the said grantee and his Heirs and Assigns all right of or to both DOWER and HOMESTEAD in the granted premises, and all other rights and interests therein.

IN WITNESS WHEREOF we the said Jerome R. Holway and Ella T. Holway

hereunto set our hand and seal this fifth day of August in the year One Thousand Nine Hundred and thirteen

Signed, Sealed, and Delivered, in presence of
Fletcher Clark to J. R. Ho
Frances Hope [illegible] to Ell. T. Ho

Jerome R. Holway (Ses)
Ella T. Holway (Ses)

COMMONWEALTH OF MASSACHUSETTS.

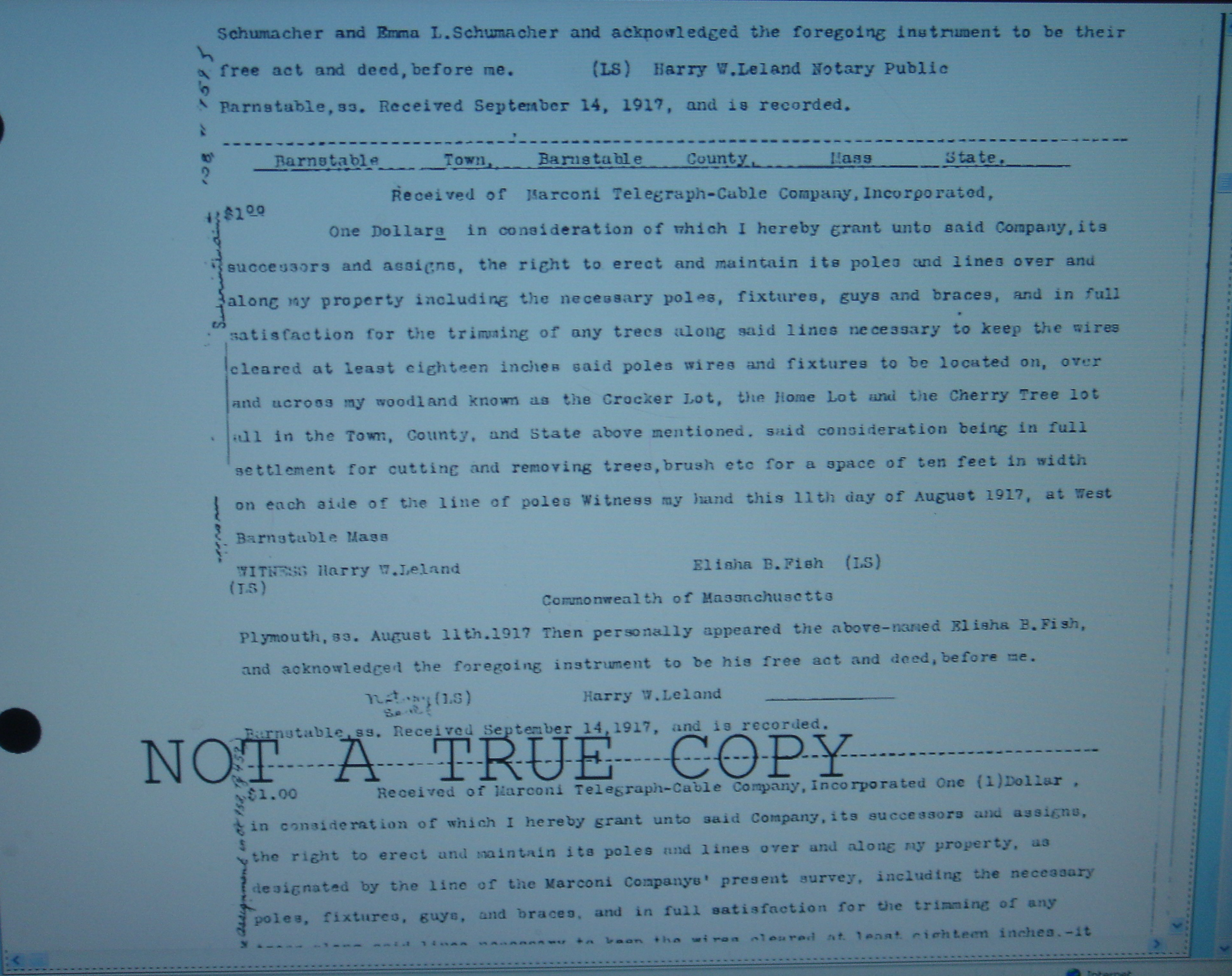
Barnstable ss.

August 5th 1913.

Then personally appeared the above-named Jerome R. Holway and acknowledged the foregoing instrument to be his free act and deed; before me,

(Sd) Fletcher Clark ~~Justice of the Peace~~ Notary Public

BARNSTABLE, ss. Received February 11 1914, and is recorded and compared



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Schumacher and Emma L.Schumacher and acknowledged the foregoing instrument to be their free act and deed, before me. (LS) Harry W.Leland Notary Public

Barnstable, ss. Received September 14, 1917, and is recorded.

Barnstable Town, Barnstable County, Mass State.

Received of Marconi Telegraph-Cable Company, Incorporated,

Subordination

$1.00 One Dollars in consideration of which I hereby grant unto said Company, its successors and assigns, the right to erect and maintain its poles and lines over and along my property including the necessary poles, fixtures, guys and braces, and in full satisfaction for the trimming of any trees along said lines necessary to keep the wires cleared at least eighteen inches said poles wires and fixtures to be located on, over and across my woodland known as the Crocker Lot, the Home Lot and the Cherry Tree lot all in the Town, County, and State above mentioned. said consideration being in full settlement for cutting and removing trees, brush etc for a space of ten feet in width on each side of the line of poles Witness my hand this 11th day of August 1917, at West Barnstable Mass

WITNESS Harry W.Leland (LS) Elisha B.Fish (LS)

Commonwealth of Massachusetts

Plymouth, ss. August 11th.1917 Then personally appeared the above-named Elisha B.Fish, and acknowledged the foregoing instrument to be his free act and deed, before me.

Notary (LS) Harry W.Leland
Seal

Barnstable, ss. Received September 14, 1917, and is recorded.

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Assignment in Bk 152 P 432

$1.00 Received of Marconi Telegraph-Cable Company, Incorporated One (1) Dollar, in consideration of which I hereby grant unto said Company, its successors and assigns, the right to erect and maintain its poles and lines over and along my property, as designated by the line of the Marconi Companys' present survey, including the necessary poles, fixtures, guys, and braces, and in full satisfaction for the trimming of any trees along said lines necessary to keep the wires cleared at least eighteen inches.-it

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(LS)

Commonwealth of Massachusetts

Plymouth, ss. August 11th.1917 Then personally appeared the above-named Elisha B. Fish, and acknowledged the foregoing instrument to be his free act and deed, before me.

Notary Seal (LS) Harry W. Leland

Barnstable, ss. Received September 14, 1917, and is recorded.

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[illegible] See Assignment in Bk 1538 pg 452

$1.00 Received of Marconi Telegraph-Cable Company, Incorporated One (1) Dollar, in consideration of which I hereby grant unto said Company, its successors and assigns, the right to erect and maintain its poles and lines over and along my property, as designated by the line of the Marconi Companys' present survey, including the necessary poles, fixtures, guys, and braces, and in full satisfaction for the trimming of any trees along said lines necessary to keep the wires cleared at least eighteen inches, -it being understood that the width of the strip of land necessary for the maintenance of said poles and lines shall not exceed Twenty (20) feet, and this grant is upon the condition that the Company, its successors and assigns shall erect a good and sufficient line of poles from its main line, hereinabove provided for, to the structures now or hereafter constituting the farm buildings and home of the undersigned, Thomas B. Kinraide, and shall allow said Kinraide, his heirs and assigns to maintain from a point on the lines of the New England Telephone & Telegraph Company, by it designated, to said line, on poles of said Marconi Telegraph-Cable Company, telephone wires for the use of said Kinraide and those now or hereafter occupying his said premises, the said telephone lines and wires to be kept in repair by said New England Telephone & Telegraph Company without expense to said Marconi Telegraph-Cable Company, Inc. Witness my hand this 27 day of August, 1917. at

Witness Harry W. Leland

Thomas B. Kinraide (LS)

Commonwealth of Massachusetts

Barnstable, ss. August 27th.1917 Then personally appeared the above-named Thomas B. Kinraide and acknowledged the foregoing instrument to be his free act and deed, before me.

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(LS) Harry W.Leland Notary Public

Barnstable ,ss. Received September 14, 1917, and is recorded.

KNOW ALL MEN BY THESE PRESENTS

that I, Irving W.Cook, of Barnstable,Barnstable County,Massachusetts,liquidating agent of the First National Bank of Hyannis, a banking corporation duly incorporated under the laws of the United States, and having its principal place of business in Barnstable (Village of Hyannis), Barnstable County,Massachusetts, a certain mortgage given by the Cotuit Cranberry Company to the First National Bank of Hyannis,dated April 1,1916, and recorded in the Barnstable County Registry of Deeds, Book 347,Page 110; a certain mortgage given by George F.Fish to the First National Bank of Hyannis, dated May 3,1916, and recorded in the Barnstable County Registry of Deeds, Book 347,Page 203; a certain mortgage given by James H.Handy to the First National Bank of Hyannis, dated May 4,1916, and recorded in the Barnstable County Registry of Deeds, Book 347;Page 204; a certain mortgage given by Albert E.Ryder to the First National Bank of Hyannis, dated May 29,1916, and recorded in the Barnstable County Registry of Deeds,Book 347,Page 280, in consideration of One Dollar and other valuabl considerations paid by the Hyannis Trust Company, a banking corporation duly created under the laws of the Commonwealth of Massachusetts, and having its principal place of business in Barnstable (Village of Hyannis),Barnstable County,Massachusetts,the receipt whereof is hereby acknowledged, do hereby assign,transfer, and set over unto the said Hyannis Trust Company, its successors and assigns, the said mortgage deeds, the real estate thereby conveyed, and the notes and claims thereby secured.

See Mortgage in Book 347 Page 110, 203, 204, 280

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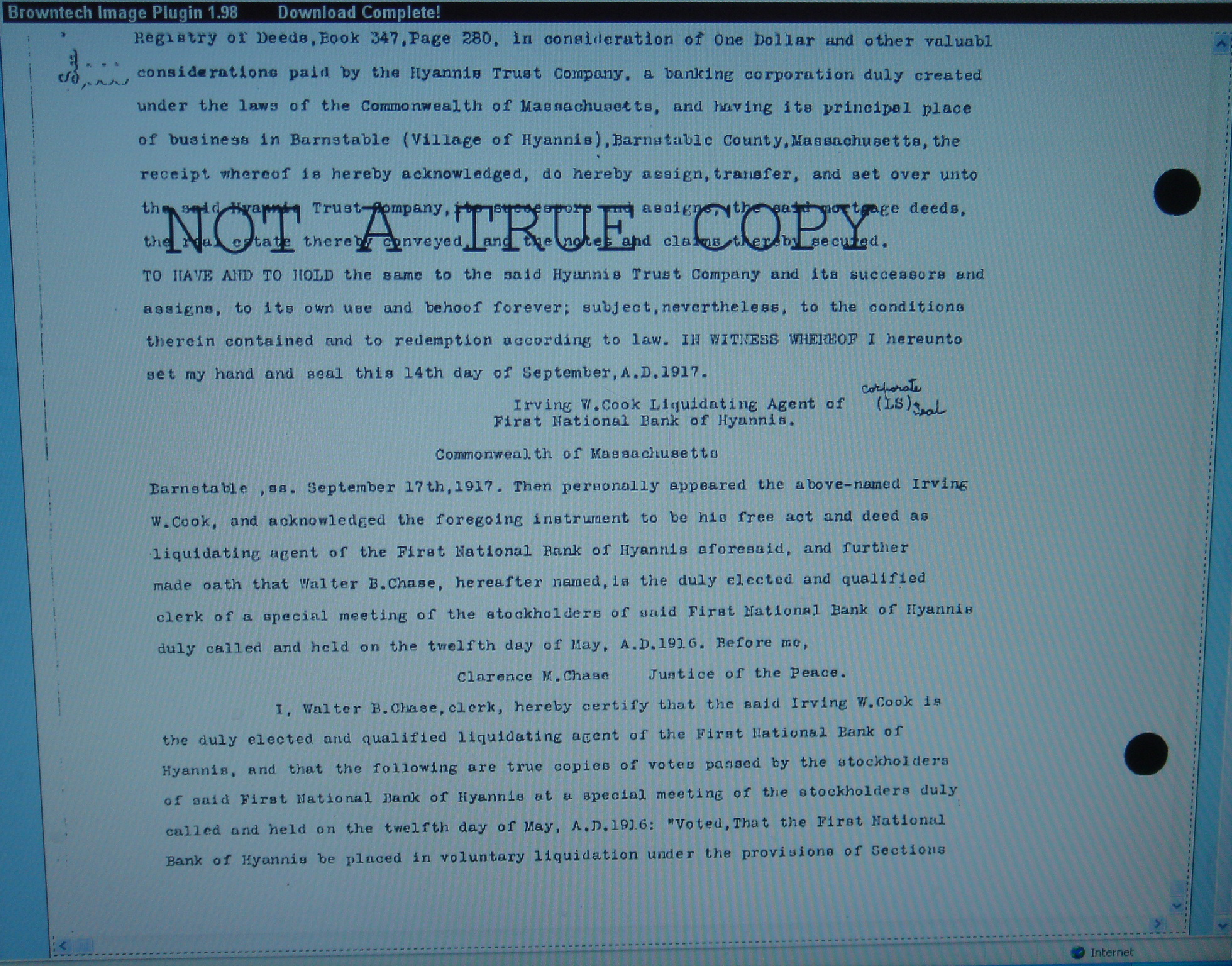
TO HAVE AND TO HOLD the same to the said Hyannis Trust Company and its successors and assigns, to its own use and behoof forever; subject,nevertheless, to the conditions



Registry of Deeds,Book 347,Page 280, in consideration of One Dollar and other valuabl considerations paid by the Hyannis Trust Company, a banking corporation duly created under the laws of the Commonwealth of Massachusetts, and having its principal place of business in Barnstable (Village of Hyannis),Barnstable County,Massachusetts,the receipt whereof is hereby acknowledged, do hereby assign,transfer, and set over unto the said Hyannis Trust Company,its successors and assigns, the said mortgage deeds, the real estate thereby conveyed, and the notes and claims thereby secured.

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TO HAVE AND TO HOLD the same to the said Hyannis Trust Company and its successors and assigns, to its own use and behoof forever; subject,nevertheless, to the conditions therein contained and to redemption according to law. IN WITNESS WHEREOF I hereunto set my hand and seal this 14th day of September,A.D.1917.

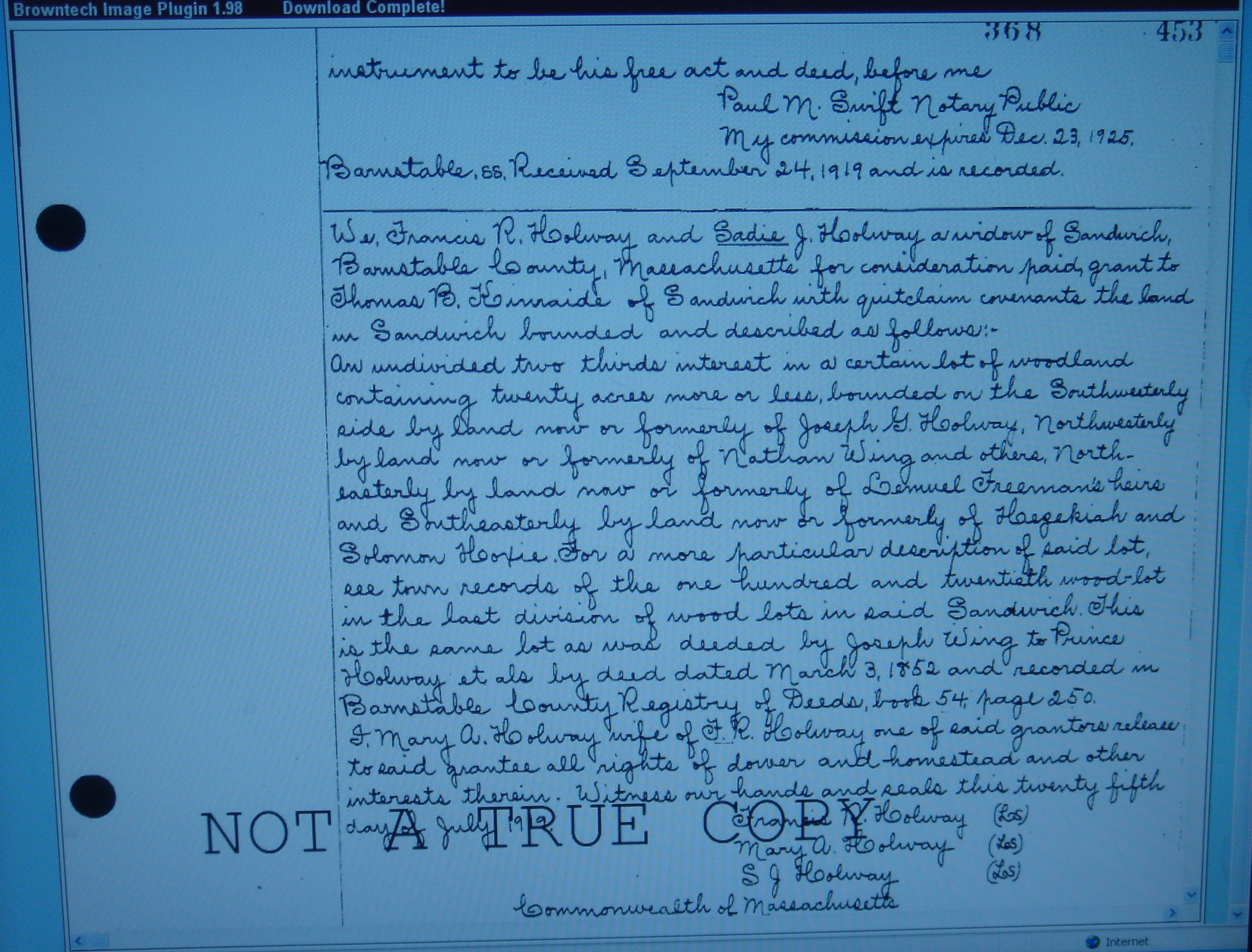
Irving W.Cook Liquidating Agent of First National Bank of Hyannis. Corporate (LS) Seal

Commonwealth of Massachusetts

Barnstable ,ss. September 17th,1917. Then personally appeared the above-named Irving W.Cook, and acknowledged the foregoing instrument to be his free act and deed as liquidating agent of the First National Bank of Hyannis aforesaid, and further made oath that Walter B.Chase, hereafter named,is the duly elected and qualified clerk of a special meeting of the stockholders of said First National Bank of Hyannis duly called and held on the twelfth day of May, A.D.1916. Before me,

Clarence M.Chase Justice of the Peace.

I, Walter B.Chase,clerk, hereby certify that the said Irving W.Cook is the duly elected and qualified liquidating agent of the First National Bank of Hyannis, and that the following are true copies of votes passed by the stockholders of said First National Bank of Hyannis at a special meeting of the stockholders duly called and held on the twelfth day of May, A.D.1916: "Voted,That the First National Bank of Hyannis be placed in voluntary liquidation under the provisions of Sections



instrument to be his free act and deed, before me

Paul M. Swift Notary Public
My commission expires Dec. 23, 1925.

Barnstable, ss. Received September 24, 1919 and is recorded.

We, Francis R. Holway and Sadie J. Holway a widow of Sandwich, Barnstable County, Massachusetts for consideration paid, grant to Thomas B. Kinnaide of Sandwich with quitclaim covenants the land in Sandwich bounded and described as follows:-

An undivided two thirds interest in a certain lot of woodland containing twenty acres more or less, bounded on the Southwesterly side by land now or formerly of Joseph G. Holway, Northwesterly by land now or formerly of Nathan Wing and others, Northeasterly by land now or formerly of Lemuel Freeman's heirs and Southeasterly by land now or formerly of Hazekiah and Solomon Hoopie. For a more particular description of said lot, see town records of the one hundred and twentieth wood-lot in the last division of wood lots in said Sandwich. This is the same lot as was deeded by Joseph Wing to Prince Holway et als by deed dated March 3, 1852 and recorded in Barnstable County Registry of Deeds, book 54, page 250.

I, Mary A. Holway wife of F. R. Holway one of said grantors release to said grantee all rights of dower and homestead and other interests therein. Witness our hands and seals this twenty fifth day of July 19[illegible]

Francis R. Holway (Ls)
Mary A. Holway (Ls)
S J Holway (Ls)

Commonwealth of Massachusetts

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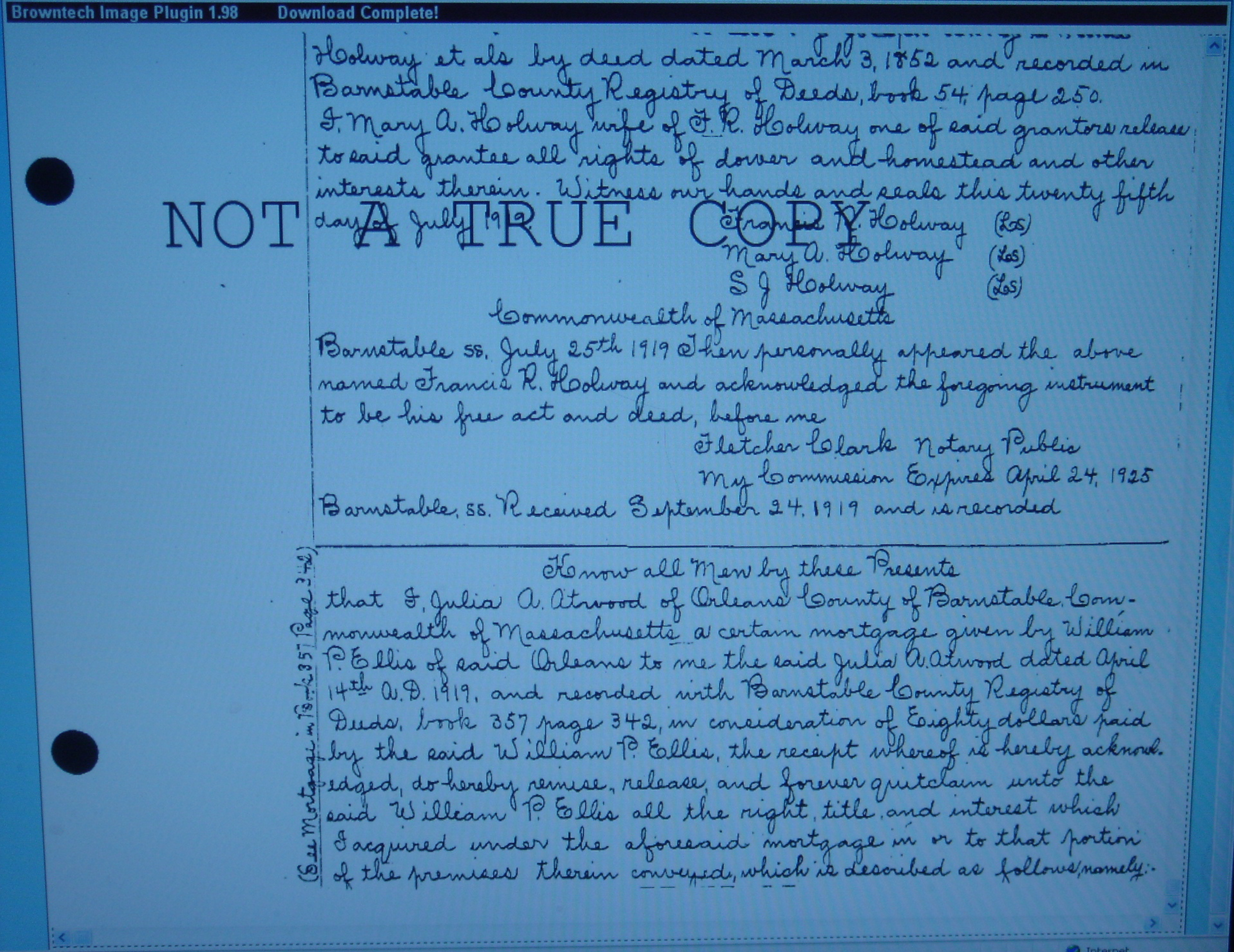

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Holway et als by deed dated March 3, 1852 and recorded in Barnstable County Registry of Deeds, book 54, page 250.

I, Mary A. Holway wife of F. R. Holway one of said grantors release to said grantee all rights of dower and homestead and other interests therein. Witness our hands and seals this twenty fifth day of July 1919

Francis R. Holway (Ls)
Mary A. Holway (Ls)
S J Holway (Ls)

Commonwealth of Massachusetts

Barnstable ss. July 25th 1919 Then personally appeared the above named Francis R. Holway and acknowledged the foregoing instrument to be his free act and deed, before me

Fletcher Clark Notary Public
My Commission Expires April 24, 1925

Barnstable, ss. Received September 24, 1919 and is recorded

(See Mortgage in Book 357 Page 342)

Know all Men by these Presents

that I, Julia A. Atwood of Orleans County of Barnstable Commonwealth of Massachusetts a certain mortgage given by William P. Ellis of said Orleans to me the said Julia A. Atwood dated April 14th A.D. 1919, and recorded with Barnstable County Registry of Deeds, book 357 page 342, in consideration of Eighty dollars paid by the said William P. Ellis, the receipt whereof is hereby acknowledged, do hereby remise, release, and forever quitclaim unto the said William P. Ellis all the right, title, and interest which I acquired under the aforesaid mortgage in or to that portion of the premises therein conveyed, which is described as follows, namely:-

and other interests therein. Witness our hands and seals this twenty-third day of June 1925.

Revenue Stamp $1.00 Cancelled | Revenue Stamp $1.00 Cancelled | Revenue Stamp $1.00 Cancelled | Revenue Stamp $1.00 Cancelled | Revenue Stamp 50cts Cancelled

J. Edward Gallagher (LS)
Margaret E. Gallagher (LS)

Commonwealth of Massachusetts

Barnstable ss. June 23, 1925. Then personally appeared the above named J. Edward Gallagher and acknowledged the foregoing instrument to be his free act and deed, before me John H. Paine Justice of the Peace
My commission expires Oct. 23, 1930

Barnstable, ss. Received June 25, 1925 and is recorded

I Alvin P. Wing of Sandwich and of Barnstable County, Massachusetts being married, for consideration paid, grant to T B. Kinraide of said Sandwich, County and Commonwealth with warranty covenants the land in the town of Sandwich and the same is further bounded and described as follows viz:- A certain wood lot in the south part of said Sandwich bounded on the Northwest by the old Mill road so called leading from what was known as Nye mill to Snake pond, bounded on the southwest by woodland formerly owned by Solomon Howland and bounded easterly by the road leading from the old Abner Hopkins place to the above said Mill road containing about four and one half acres be the same more or less it being a three cornered lot. Being the same premises conveyed _ Seth B. Wing by deed dated December 10, 1857 and recorded in Barnstable County Registry of deeds Book 1 s. 280 Page 148. I, Elizabeth C. Wing wife of said grantor release to the grantee all rights of dower and homestead and other interests therein Witness our hands and seals this sixteenth day of October 1914

Alvin P. Wing (L.S.)
Elizabeth C. Wing (L.S.)

Commonwealth of Massachusetts
Barnstable ss. October 16th 1914 Then personally appeared the above named Alvin P. Wing and acknowledged the foregoing instrument to be his free act and deed, before me

Fletcher Clark Notary Public

Barnstable, ss. Received June 25, 1925 and is recorded

Know all Men by these Presents

that I, Frederick A. Wendell, of Quincy, Norfolk County, Massachusetts for consideration paid, grant to Charles W. Hopkins [illegible] F. Mitchell both of Orleans, Barnstable County, Massachusetts with warranty covenants

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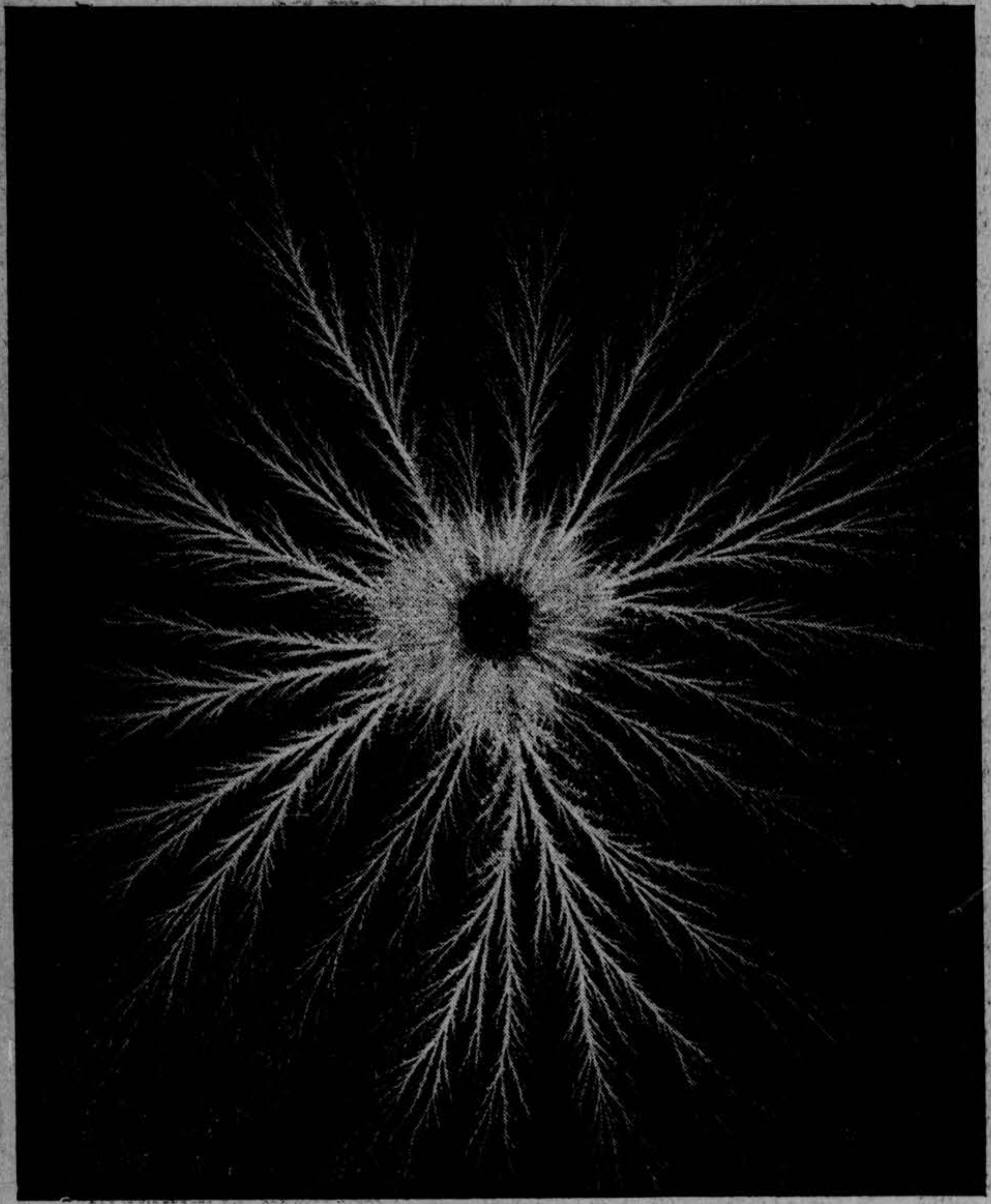
World-Astounding Electrical Discoveries Made by Thomas B. Kinraide of Jamaica Plain.

Remarkable Discoveries in X-Rays and Wireless Telegraphy.

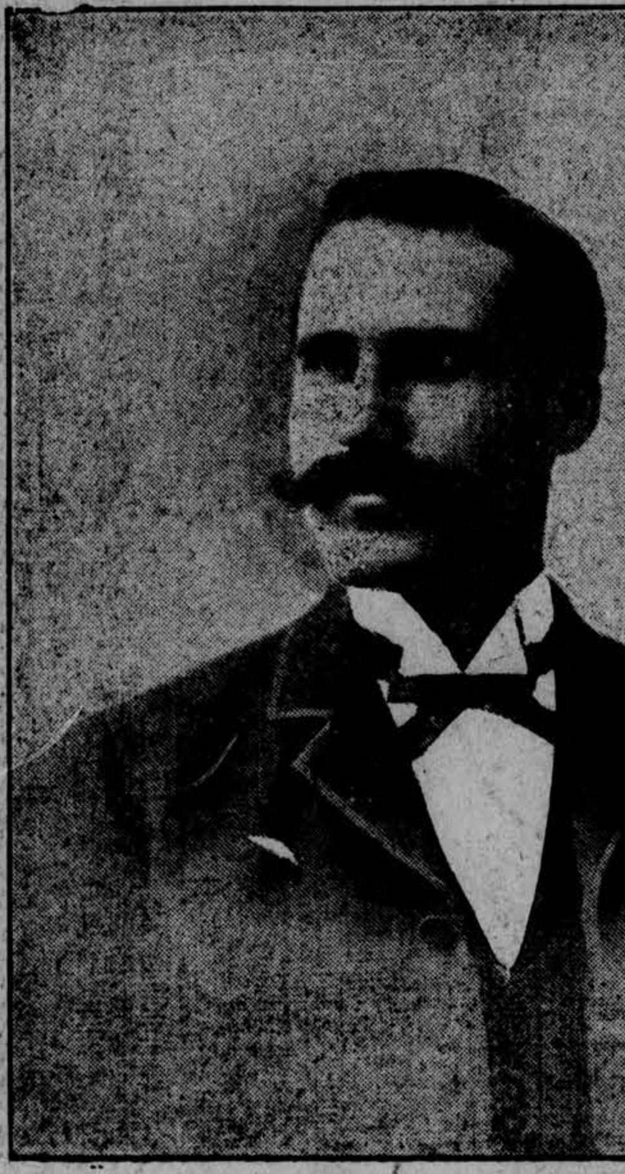
Every Day of His Work Endangers His Life.

Results Attained Will Attract the Attention of Scientists the World Over.



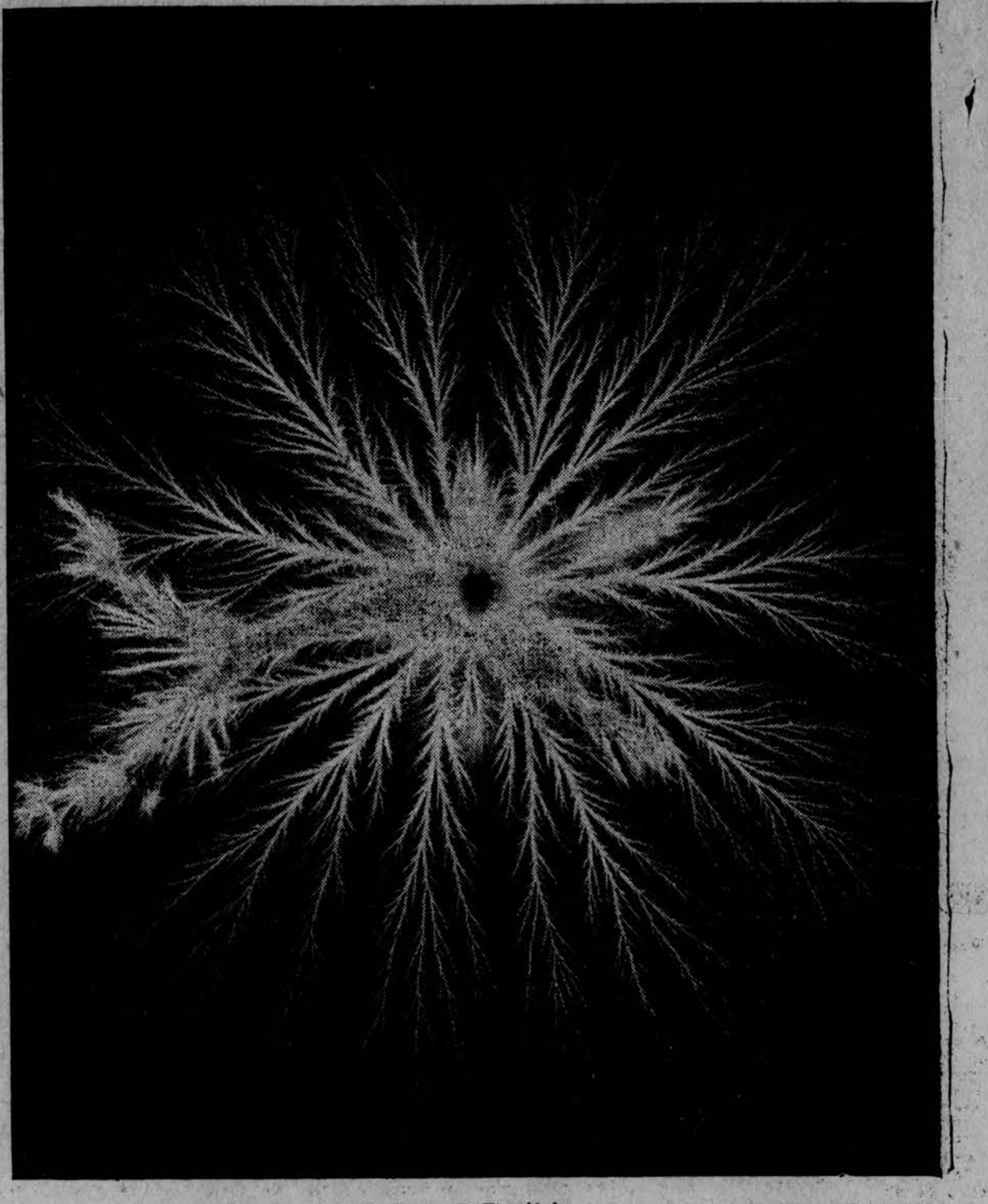
(Copyrighted, 1900, by Thomas B. Kinraide.)

PLATE I.—Negative electricity in its pure form, uninfluenced. It unvaryingly assumes this fern-like structure when discharged into the air. Here the discharge was made to photograph itself upon a sensitive plate.



(Photo by Hastings.)

THOMAS BURTON KINRAIDE.



(Copyrighted, 1900, by Thomas B. Kinraide.)

PLATE II.—The fern-like rays are negative. The feathery, cloudy rays show the unvarying appearance assumed by the positive discharge. This is what Mr. Kinraide calls an electrograph. No camera was used.

There is a man in Jamaica Plain who is in danger of becoming one of the most famous scientists in the world. His neighbors don't know it; the great public hasn't the least suspicion of it. Only a few brother scientists have found him out. Some of the marvellous results of his years of patient experimenting are told the public for the first time in today's Post.

Science, unlike most things else, makes famous in a single day such of her devotees as she deigns to grant a place in the roll of her chosen ones. Long years of patient effort, of working in the dark, of seeking after elusive knowledge, may be futile. Many a man knows that to his sorrow, but they may end in a sudden, dazzling burst of radiance that shall leave a halo round a man's head for the rest of his natural life and as long as human knowledge shall be sought after.

The conclusive grasp of some law in nature that no one before has ever been able to fathom raises a man in a day, as soon as it becomes known, from a humble, ordinary citizen to a position of admittedly absolute power in his particular field of investigation. Edison, Harvey, Faraday, Herschel, Marconi, became famous in a day. The world took no note during their years of patient research. It recked not of sleepless nights, of repeated failures, of heroic perseverance. But when of a morning it woke and heard the news of marvellous results obtained, then the world bowed its head in admiration of the man whose name the day before it had never heard.

To the famous trio of names so notably associated with the development of electrical appliances, Edison, Tesla, Marconi, it seems that a fourth should be added, and this one, happily, that of a Boston man, Thomas B. Kinraide of Jamaica Plain. Mr. Kinraide himself is not seeking the honor. On the contrary, he shrinks in an exceptional degree from public notoriety; but if the predictions of those who ought to know come true, Mr. Kinraide's achievements cannot fail to make him famous the world over.

Mr. Kinraide is a young man, but he has succeeded in doing several things that nobody else has ever done. For one thing, he has succeeded in photographing positive and negative electricity, and has discovered that each has its individual and unvarying form. He has invented a new and powerful form of transmitter to be used in wireless telegraphy, from which he has obtained unprecedented results. He has invented a new form of induction coil and has shown its practical value by its use in his apparatus for X-ray photography, which is the most valuable ever set up. Besides all this, he has conducted experiments along other scientific lines, and has made a set of instruments that will measure over 100,000 sound vibrations per second.

It seems incredible that a man who has already accomplished so much should be so little known. But the reason for it lies in several causes. One of these is that Mr. Kinraide is an exceedingly modest and equally quiet man; another is that he has always had ample means at his command, so that he has not been obliged to work from a commercial standpoint, while still a third reason is that his experiments have always been carried on in his own house and comparatively few people have known anything about them.

HOW HE HAS MADE ELECTRICITY TAKE ITS OWN PICTURE.

Mr. Kinraide is not the first man who has succeeded in photographing electricity, but he is the first man who has been able to secure separate pictures of the positive and the negative, and thus to determine the shape of each. His experiments along this line—in making electricity photograph itself—electrographing, he calls it, began about four years ago. The results are not only of the greatest scientific value — they are marvellously beautiful as well.

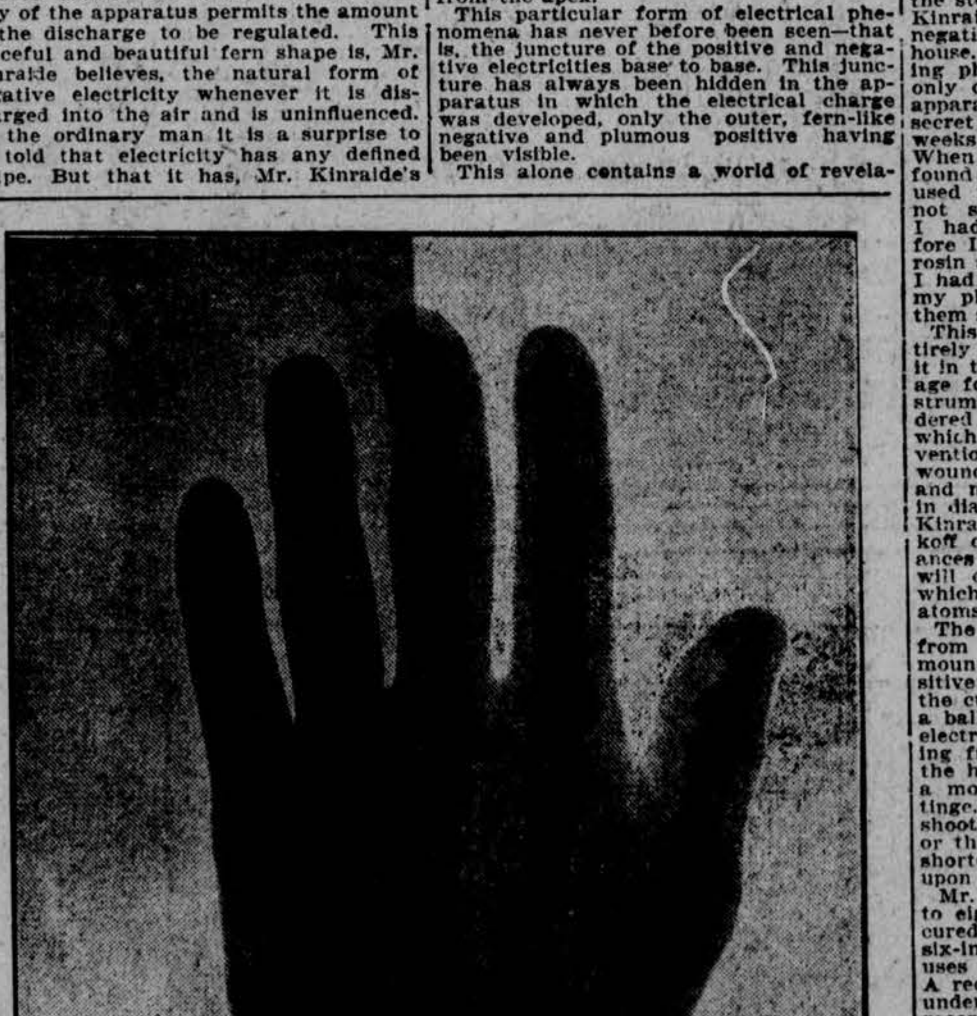
In this work no camera is used. The electric fluid is made to print its own picture on ordinary sensitive plates. And the pictures it prints are wonders of graceful designing. Negative electricity has invariably the exquisite fern-shaped appearance shown in the half-tone reproduction on this page. Mr. Kinraide describes this as filisiform, that being the Latin word meaning fern-shaped. Positive electricity has a well-defined feathery appearance, which is more readily noticed when the pictures are enlarged.

Strictly speaking, the positive is formless as compared with the complicated form of the negative. Its appearance is that of a cloud, plume-like, very similar to the cat tails of the long-leaved meadow flag. This plume, varying from six to ten inches in length, is supported upon a delicate stem from one to three inches long, the plume a pale violet color, the stem the vivid white of the electric spark.

Thus far Mr. Kinraide has failed to persuade this form to appear upon the sensitive plate. It is in no way affected by the plate's presence, completely ignoring it, except to fog the plate where it passes through it. Only by using the negative electricity in controlling it has he succeeded in photographing modifications of this form.

The half-tone reproduction on this page marked "negative electricity in its pure form, uninfluenced," is one of a valuable series of pictures of the negative current. The first plate in the series shows just one frond or fern leaf starting from the centre. The second shows two or three, and the succeeding plates show each a greater number of fronds until the perfect number seen in the plate here is found.

In the printing of each plate the current is broken but once, but the delicacy of the apparatus permits the amount of the discharge to be regulated. This graceful and beautiful fern shape is, Mr. Kinraide believes, the natural form of negative electricity whenever it is discharged into the air and is uninfluenced. To the ordinary man it is a surprise to be told that electricity has any defined shape. But that it has, Mr. Kinraide's pictures unquestionably prove.



(Copyrighted, 1900, by Thomas B. Kinraide.)

X-ray picture taken in less than one second's exposure, showing the definition secured both with and without screen. This gives the clearest definition in the shortest time so far secured.

In a recent lecture before a body of scientists at the Massachusetts Institute of Technology Mr. Kinraide, in referring to this, said:

"I trust that I will not be too severely condemned for having become infatuated with the beauty that this work has presented to me. No words that I can use can express the grace and splendor that these forms reveal. To me it has been a revelation of a world beautiful, hidden hitherto and unknown.

"These beautiful shapes are the true symbols of electricity, and in time to come I sincerely trust that when we see electricity symbolized it will either be a figure holding these fronds or the fronds themselves.

"I cannot but feel that the artist will welcome these photographs as studies that cannot be found elsewhere.

"We have all experienced a feeling of awe when dealing with this peculiar force, but have not hitherto seen it in such a way as to be moved to admiration. Now that the opportunity is presented to you to see this force embodied in its true form, incarnated, as it were, and revealed to your eyes, you will not only know it better, but will give to it the sincere appreciation that most certainly is its due."

In securing these electrographs the electrical current is made to discharge from a sphere. Sometimes it happens that the sphere attracts to itself electricity from the air. Then there are inward discharges. This creates the most interesting phenomena of all. The Post plate numbered 3, which is a section of a large plate, shows the formation of the inward discharge. It is seen to be both positive and negative. The light, triangular spot has at the base of the triangle the outshooting of the characteristic fern-like negative electricity. From its direction it can be seen that this is shooting in towards the sphere. At the apex of the triangle is the plumous positive. Somehow the two merge or are united in the triangular space.

Wherever these triangles are found there is the same arrangement, the negative emerging from the base, the positive from the apex.

This particular form of electrical phenomena has never before been seen—that is, the juncture of the positive and negative electricities base to base. This juncture has always been hidden in the apparatus in which the electrical charge was developed, only the outer, fern-like negative and plumous positive having been visible.

This alone contains a world of revelation, which Mr. Kinraide believes is the key which will unlock many of the mysteries hitherto associated with electricity.

It will have particular value in the ultimate conclusion at which Mr. Kinraide hopes to be able to arrive as a result of his electrographing. As yet he has not finished his experimenting in this line, and he is not willing to commit himself to any statement as to what the plates already secured show in regard to the nature of electricity. He does admit, however, that the theory which is forming in his mind, and which these pictures are, one after another, confirming him in, is one that has never been put forward. It is quite different from the theories so far accepted by scientific men in regard to the nature of this wonderful force.

It is not desired in saying this to claim that Mr. Kinraide had a preconceived theory and that he is proving it. It is more correct to say that a theory has been forming in his mind during the years he has been carrying on this line of investigation, and that the various phenomena as they develop all tend to make this theory grow stronger. It has now settled almost into a conviction, but Mr. Kinraide is unwilling yet to formulate it for public utterance.

The theory of the nature of electricity, as now accepted by the most reputable scientists, is that it is either a single fluid or a dual one. The supporters of the former view claim that so-called negative electricity is but the withdrawal or absence of the positive or real electricity. Mr. Kinraide is convinced that his photographing experiments are to settle this much debated question once and for all. He believes that they will even do more than this, that they will give scientists such a clear knowledge of the nature and character of this mighty force that study of electrical development on all lines will be rendered vastly more intelligible. In this way his work, which might seem at first glance the pastime or hobby of a man of leisure, will have a distinctly practical and commercial character, and prove of inestimable value to the public at large.

FAILURES BEFORE SUCCESS.

It could not be expected that these remarkable electrographs would be secured until after repeated attempts. "These beautiful and perfect plates do not tell the story of my many failures," said Mr. Kinraide, "but I have a stack of spoiled negatives big enough to make a greenhouse. Disappointing failures in securing photographs were not, however, my only ones. I had first to construct my apparatus. After I had discovered the secret of the flat-disc coil I was for weeks at the mercy of the condenser. When I had made that satisfactory I found that the ordinary oil insulation used in high voltage apparatus would not stand the enormous strain. Then I had to work for a long time before I hit upon just this combination of rosin and beeswax that I now use. Then I had to learn the process of developing my plates, as I could not wait to have them sent out to a photographer."

This electrographing apparatus is entirely unique. There is not another like it in the world. It controls a higher voltage for the quantity than any other instrument so far made, this being rendered possible by the new flat disc coil which is Mr. Kinraide's most valuable invention. This consists of No. 34 wire wound concentrically in about 1000 turns and making a disc about twelve inches in diameter. This form of coil will, Mr. Kinraide is confident, supplant the Rumkoff coil in all kinds of electrical appliances used in high voltage work. It will easily withstand a pressure under which the Rumkoff coil splinters to atoms.

The beautifully polished brass sphere from which the current discharges surmounts the apparatus. Upon it the sensitive plate is carefully balanced. When the current is broken the sphere becomes a ball of intensified light. The negative electricity shoots out its graceful, quivering fronds in pale, delicate violet, while the heavier, plumous positive glows with a more brilliant intensity, still violet in tinge. Sometimes these gorgeous displays shoot out into the air to a length of two or three feet. Sometimes they are much shorter. The length depends somewhat upon the size of the sphere used.

Mr. Kinraide has used spheres from one to eight inches in diameter. He has secured the best results from the five and six-inch spheres. With the large ones he uses the largest size plates, 18x22 inches. A record is kept of the exact conditions under which every plate is secured. This record is quite as valuable as the plates, and furnishes a key, as it were, to the various phenomena photographed on them. It gives Mr. Kinraide the materials for an exhaustive treatise. And this he will probably issue at no very distant day. In the meantime, he makes no secret of his work, and in the lecture above referred to he explained quite fully the construction and working of his apparatus.

HIS X-RAY APPARATUS.

Mr. Kinraide has applied the principle of the flat-disc coil to an X-ray appliance with remarkably satisfactory results. Several of his X-ray instruments are in use in this city, one in the Massachusetts General Hospital and one in the Children's Hospital. In both these institutions the operators and physicians speak most enthusiastically of the results obtained. Several prominent physicians of the city are also using them in their private practice. They are valuable not only in radiographing instruments, but, on account of their extreme voltage control, as ozone generators.

The electricity by which these machines are operated is the direct or alternating current of the commercial electricity of the city. A machine for the alternating current has been completed this week in Mr. Kinraide's laboratory for the Troy (N. Y.) Hospital. Mr. Kinraide will personally set it up there and start it in operation.

The X-ray picture of Mr. Kinraide's hand in the plate numbered 4 was taken by one of these instruments. The exposure lasted less than one second. The definition with and without a screen is shown. No such perfect definition has ever before been secured in the same length of time. The plate was an ordinary standard plate and no especial pains was taken in developing it. If an especially prepared X-ray plate had been used it is probable that a much clearer definition would have been secured.

A NEW APPLIANCE FOR WIRELESS TELEGRAPHY.

Probably the most extensive commercial benefits resulting from Mr. Kinraide's experimenting will be in the line of wireless telegraphy. His new coil is destined to revolutionize the apparatus now used for making experiments in this department of electrical science. He has already demonstrated this to his entire satisfaction, and as soon as he is able to discontinue his electrographing work he intends to devote himself exhaustively to perfecting his wireless telegraphy devices. He expects to begin work along this line during the coming summer.

Already he has transmitted signals over short distances with surprising results. His experiments so far have been with the telegraphing device used with wires in lecture halls. With this appliance, yet without even a perpendicular or a ground wire, he has sent signals with perfect ease from the cellar of his house to the cupola, four floors above. This, perhaps, seems simple, but when it is remembered that the house is filled with a network of charged wires in voltages from 20 to 550, with dynamos in constant motion and with storage batteries innumerable, it can be seen that for an electrical impulse to be sent through the various floors and to escape the powerful attractions surrounding it and be recorded by the receiving apparatus is full of significance. As yet, Mr. Kinraide has not used code signals, but he proposes to do so in his forthcoming experiments.

He has had equal success in transmitting electrical impulses from his laboratory to a house at perhaps a quarter of a mile distant. Here, again, neither perpendicular nor ground wire was used, and yet every impulse sent was recorded. This is greater success than that obtained under the recent trials at Blue Hill Observatory, which were carried on under the auspices of the Smithsonian Institution.

All these three instruments made by Mr. Kinraide, the electrographing machine, the X-ray apparatus and the perfected wireless telegraphy appliance, owe their remarkable efficiency to the arrangement of the secondary induction coil. This simple invention seems destined to revolutionize one department—and that a most important one—of high voltage electricity. Just how great its value will ultimately become no one is yet able to foresee.

A WONDERFUL LABORATORY.

The inventor of these wonderfully delicate and sensitive machines is not yet 36 years of age. He is not a large man, yet built with the figure of an athlete. It would be difficult to find anywhere a quieter person. He has the blackest of hair and eyes. There is a reserve power about him that commands respect, and as soon as he begins to speak one listens involuntarily.

A Post reporter found Mr. Kinraide in his laboratory one day this week. Mr. Kinraide could not be induced to talk about himself, although with cordial courtesy he was willing to talk about the great science in which he is so much interested. He allowed the reporter to visit his laboratory and to see the wonderful photographs he has made.

This laboratory is one of the most perfectly equipped in the country. Every appliance that could possibly be needed is at hand. It is the workshop of a man of science rather than of an artisan. The utmost neatness and order prevail, and not a speck of dust is to be discovered. Mr. Kinraide has in his employ several skilled mechanics. His master workman is one of the cleverest men in the country in his line of work. There is a constant buzz of turning wheels, as the dynamos are in constant motion. As before noted, these are run by city power. There is one for the 550 commercial volt and one each for the 220, the 110 and the 20-volt current. Besides this direct current Mr. Kinraide makes use of large storage batteries to furnish him with the intermediate voltages, so that he can use a voltage from zero up to an indefinite number.

To look at the outside of this remarkable laboratory one would never suspect its character. "Ravenscroft," which is the name of the house, looks like the residence of a wealthy man. There is no hint that it is the workshop of a great electrician. But as one steps on to the broad piazza and pulls the bell his ear catches at once the buzzing sound within. Then he knows that there is something besides an afternoon tea going on inside. The whole lower floor of the house at the left of the front entrance is given up to the laboratories, the house being specially designed for this purpose. At the right, in front, is Mr. Kinraide's private office, but leading from the small tiled hallway between is a second hall opening into the residential part of the house.

Up from this inner hall leads the broad stairway to the wide parlors above.

Mr. Kinraide's "dark room," where he makes his photographs, is in the cellar. It is the most interesting room possible to imagine. Access to it is by means of a dark stairway leading from the office. This stairway is panelled in beautifully polished oak and softly carpeted. The room itself is fitted in the same fashion. It is very large and high studded. A brilliant fire of coals glows in the grate. No ray of sunlight can penetrate this fantastic room, but at the touch of a button it can be flooded with brilliant light.

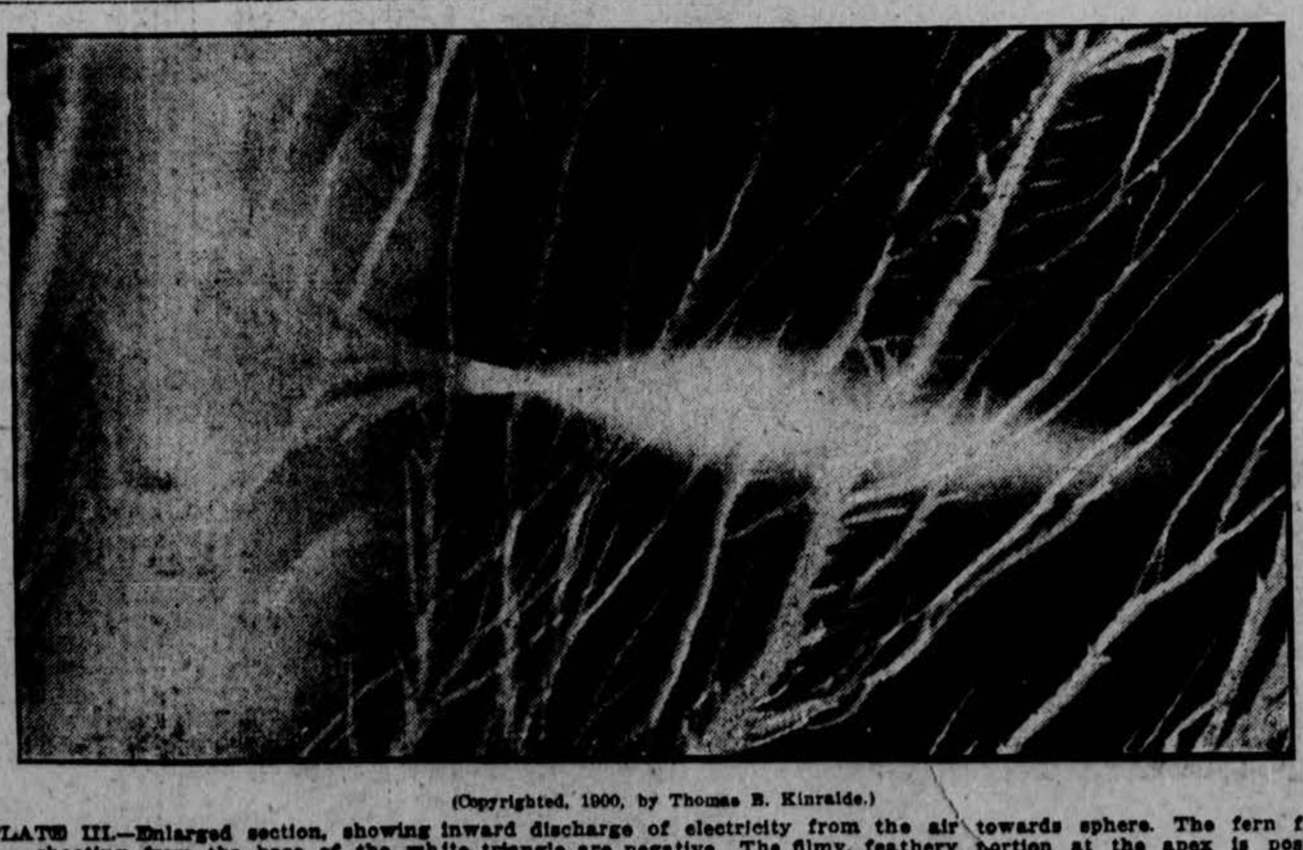


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PLATE III.—Enlarged section, showing inward discharge of electricity from the air towards sphere. The fern forms shooting from the base of the white triangle are negative. The filmy, feathery portion at the apex is positive. There is a union of the two in the triangle itself.

This is, perhaps, the fancy of a man of science. It is certainly a most interesting room. Here Mr. Kinraide takes the wonderful electrographs, which are sure to make him famous. Here, too, he has a lantern for throwing on a screen and studying the plates photographed.

Mr. Kinraide, thus fortunately environed, can work with tranquillity along the line of his chosen profession, not caring whether the world pays any attention to him or no. He does not even advertise the X-ray machine which he has made, and which is so valuable. "There is no need of my doing so," he says. "If a person is in search of an apparatus for X-ray work he will make inquiries and not be satisfied until he finds the best there is. Naturally a man's investigations would lead him to Boston, which seems to be a centre for this work."

HIS EXPERIMENTS ENDANGER HIS LIFE.

One would not suspect from the quiet manner in which Mr. Kinraide talks about his electrical experiments that very much of his work is carried on under the most dangerous conditions. But as a matter of fact he has several times barely escaped electrocuting himself. He frequently receives electrical discharges, and his hands show the marks in their seared flesh.

"The nervous strain under which this work is carried on," he said, "is something practically impossible for anyone to realize. After receiving two or three discharges I am unable to work for a considerable time. Then the fascination of the work comes on me again; I simply cannot stop. It is something that takes possession of one and impels him to go on."

Under the constant recognition of the ever imminent danger to which he is subject, a curious and highly interesting muscular contraction has developed itself in Mr. Kinraide's arms. This contraction, wholly involuntary, is controlled undoubtedly by the nerves of the sympathetic system. It has been the means of saving Mr. Kinraide's life on more than one occasion. It is an instinctive movement which leads him to draw away his arms from the instrument he is working with during the two or three seconds before the force of the current, which he recognizes is coming, reaches him. It is a movement which takes place more quickly than it could be controlled by thought.

This would form an interesting study for the psychologist and neurologist. Upon it Mr. Kinraide depends for his safety.

It is, perhaps, unnecessary to say that Mr. Kinraide is both a man of limitless patience and of great mechanical ability. Had he not been the former, he would never have devoted himself so constantly to his work as to secure the results he has secured; had he not been the latter, he could never have constructed the appliances that have enabled him to reach the front rank among electrical investigators.

Some of the most widely known scientists of this city speak in most cordial terms of the remarkable achievements of Mr. Kinraide.

Professor Cross of the Institute of Technology says: "Mr. Kinraide's photographs of the electric spark are certainly the most remarkable ever obtained. He has any amount of inventive genius, and is an exceptionally skilful mechanic. I consider his X-ray screen the best made. Some of his work in acoustics, too, has gone beyond that done by any other investigator. I am told that his X-ray machine is the best that has yet been made. His new form of induction coil is certainly very interesting. About its application to wireless telegraphy I do not know, because I have not investigated it. Mr. Kinraide is an exceedingly modest man. His lecture given here before the Society of Arts could not have been more modestly given."

Dr. C. L. Norton spoke of Mr. Kinraide as "an earnest and capable experimenter and a man of dignified standing among the professional scientists of Boston." He also referred to the various lines of investigation in which Mr. Kinraide had gone deeper than any other experimenter.

OTHER INVESTIGATIONS.

Before beginning this work in electricity Mr. Kinraide had made some very interesting experiments in acoustics. He invented a series of forks which are capable of measuring sound waves from those inaudible to the human ear to those which vibrate over 100,000 times per second. There are about fifty forks in the series. This invention has no practical commercial application, but is of great value in scientific investigation.

The forthcoming exhibit of Mr. Kinraide's photographs in the Old Corner Bookstore will show to the world for the first time the true forms of electricity. It will also show to the Boston public that one of Boston's citizens, hitherto comparatively unknown, is one of the leading electricians of the age. Mr. Kinraide's limitless patience has already met with its own reward in the marvellous results he has secured, but it has not been recognized as it will be when once the public is apprised of his achievements.

GOVERNOR CRANE HAS CROSSED "THE BURNING SANDS" AND IS NOW A MYSTIC SHRINER.

He has tasted of the Sacred Camel's milk.
He has drunk of the Zem Zem waters.
He has walked o'er the red-hot gridiron.

What happened to his Excellency or to his Excellency's clothes when he descended into the secret pit is locked in the secret archives of the Shriners. This is known, that the initiation did not result in a funeral. The Governor is at his desk as well as ever, and yet he may now wear the "fez" cap and participate in the festivities of the most remarkable secret society on earth.

Governor W. Murray Crane has crossed the burning sands.

He has tasted of the sacred camel's milk of the Zem Zem waters. Sparks still glow under the sacred gridiron of the Mystic Shriners, and the three-humped camel humps himself proudly as he rests from the toilsome journey.

It now is his privilege to wear a red "fez" cap and to participate in the festivities of the most remarkable secret society on earth. It requires a building as big as Music Hall or the Mechanics' building to accommodate the crowd that assemble at the Shriners' festivities.

Just what ordeal Governor Crane passed through to enter the walls of Mecca he'll never, never tell. But the printed notices of the recorder to the Illustrious Nobles are full of hints which indicate that a hot political campaign is cold and placid compared to the journey "across the burning sands." Thus it is written:

A victim of the Temple lay gasping at the Shrine.
There was lack of cooling water, and fires were blazing fine;
But a Shriner stood beside him, as his courage oozed away,
And rubber-necked to listen to the other's plaintive lay.

The wretched victim murmured, as he grabbed the Shriner's paw:
"Say, Cully, what d'ye think yer doin' all this for?
Can't yer let up just a little on this racket hot of mine,
Or must I have some more to be a Shriner of the Shrine?"

The same notice in which the above poem appears contains these notices:

"Our system of rapid transit beats anything else in town."

"Tell your friends among the novices to make their wills if they have anything to leave."

"Lo! When ye rest in the dark chamber, rebuke not the Tarantula because his little feet crawl hotly athwart thy naked limbs. The 'Tarant' is a hot bird. He was born that way."

An artist of the Shriners has pictured one stage of the journey across the burning desert, which was taken by the highest official of this Commonwealth. A vast gridiron glows white hot, while black demons lead the pilgrim across; but the traveller has had the foresight to strap cakes of ice on his feet, and he laughs in scorn at hairy serpents and purple lobsters.

Often in his "journey to Mecca" did the pilgrim from Dalton have cause to wonder whether the State would be ruled over by himself or by "Acting Governor Bates" within a few hours. For such exhortations as these rang in his ears:

"Obey without questioning. Disobedience to this rule is fraught with danger. Inattention thereto was the sole cause of the sad occurrences noted in the daily press at various times, and which have given rise to such idle rumors in regard to the secret work of the Shriners. Obey! And then, if the result is fatal, the Temple will attend the funeral in a body.

"When branded with the Mystic symbol of the Arabic Order, do not shrink. Summon all your nerve and stand firm. To wiggle and twist only make the Moolah nervous, and often causes an unsightly scar, in place of the clear-cut Arabic character so much admired.

"When descending into the Secret Pit, under no circumstances loosen your hold on the rope. (N. B.—Attention to this rule would have prevented the nearly fatal accident at 'Temple of the Oasis of Sunken Wells,' at Kalamazoo.)

"Touch nothing you see in the Chamber of Horrible Despair, no matter how great your seeming need. (Those who are subject to heart trouble will be excused from this test upon mentioning their desire to the Director of Torture.)

"During the 'True Test of Mortal Courage' be as calm as possible. Even a second's hesitation at this point may produce disastrous results. Bear in mind also that there are several well-known physicians among the Nobles, one or more of whom are required to be close at hand during this exciting period.

"Wear your old clothes when appearing as a candidate. The 'fund for replacing ruined clothing' is nearly exhausted. The carrying of firearms is forbidden.

"Any candidate not used to athletic exercises will be excused from taking active part in the 'Supreme Test of Physical Endurance.' The Grand Vizier's physician has decided that only a high order of personal strength enables one to stand the strain.

"Never speak unless spoken to. The Koran wisely says, 'A word in the mouth is worth two in the air,' and 'in the presence of the Potentate the wise are ever silent.'"

Often from the distance would be heard the voice of sirens singing this beautiful ballad perpetrated by Benjamin W. Rowell, poet laureate and wit of the Shriners:

Send in your friend in a sheet-iron suit,
Label him, "He wants it all,"
Then "be there" and help us make him root
When he treads the sands of the Shriners' hall.

Another favorite song alleged to be by the same poet, is this:

How dear to my heart is the sight of the victim,
What fond recollections it brings to my mind:
I ate from a mantel for weeks after riding
The hump of that camel whose milk was a find.

The hump of that Camel, that broken-backed Camel,
It hurts every time that I think of it now;
I wish B—— would take it and pad it with flannel,
'Twould drive fear away from the votary's brow.

The foregoing verses, jests and hair-raising hints of "a hot time on the desert tonight," are all taken verbatim from the printed circulars of the local temple of Mystic Shriners of Massachusetts. These "friendly hints" are all the glimpse that the outer world is permitted to receive of the ordeal through which every pilgrim—be he Governor or day laborer—is required to pass before he comes to the oasis where the Zim Zim waters flow and the Bulbul sweetly sings.

"Climb the camel! Twang the Zwiptuth! Tickle the harp! Blow the swinette! Strike the hum-strum! Blow the kratch-ed!"

Thus proclaimed the Potentate in calling the faithful to the revels.

Of what follows, the laureate has written:

The road to Mecca is beset
With dangers dark on every side;
The hills are steep, the valleys wet.
Trust Allah, then, and let 'er slide.

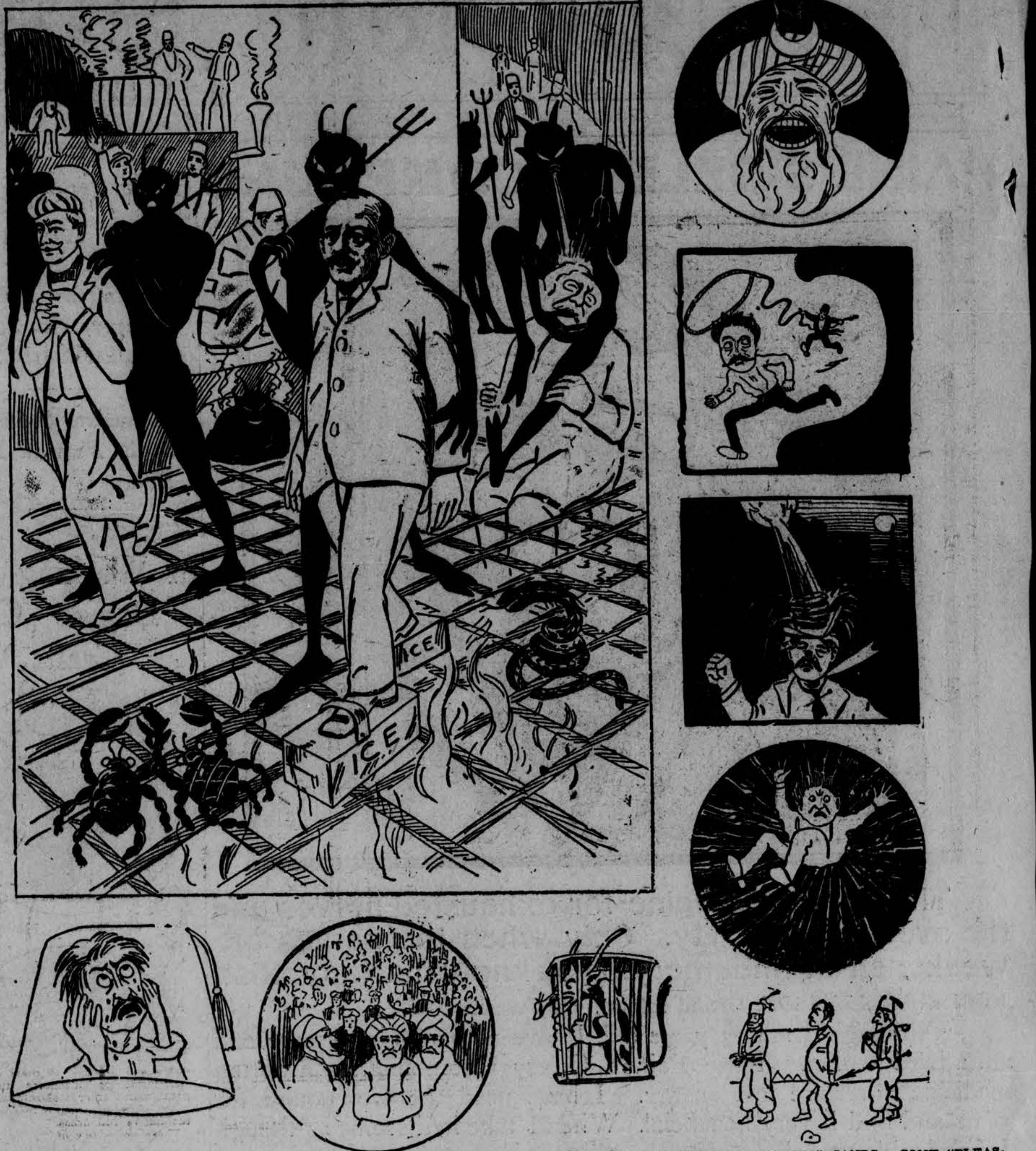
Your only hope in in the rope,
From which you hang o'er sharpened stakes;
But grip it tight and you're all right,
Unless, of course, the old thing breaks.

The growth of the Mystic Shrine has had two recent forcible illustrations. One was the institution of Melha Temple at Springfield, with which his Excellency is allied. The other was the movement of Aleppo Temple's caravan during the past week from Music Hall, which it has outgrown, to the more ample quarters at the Mechanics' building, where nearly 2000 nobles were in attendance.

It is an interesting fact that one of the most widely famous humorists in the United States is almost unknown outside the circle of the Shriners. This is Recorder Rowell of Aleppo Temple. His wit, specimens of which have been shown herewith, has had much to do with the extent of Aleppo Temple's fame; and while the allusions to "burning sands" and "Chambers of Horrible Despair" are, of course, in the same class with the traditional "goat" of other societies, Recorder Rowell's graphic pen has given them a picturesque dressing truly unique.

"The Order of Nobles of the Mystic Shrine was instituted by the Mohammedan Kalif-Alee, cousin-german and son-in-law of the prophet, Mahomet, in the year 656 A. D.," is the account given by a chronicle of the fraternity. The original purpose was "to dispense justice and to promote religious tolerance among cultured men of all nations. . . . The ritual is a translation from the original Arabic found preserved in the archives of the order of Aleppo, Syria. The prerequisite for membership in Europe, Asia, Africa and America is the 32d degree Ancient and Accepted Scottish Rite (18 degree in England), or a Knight Templar in good standing."

Governor Crane, having performed the mystic journey and attained the seat of the ~~blessed~~, now joins in the Arabic pean of the centuries, "By the grace of God, we have found repose."



HOW THE MYSTIC SHRINERS PICTURE THE JOURNEY OF GOVERNOR W. MURRAY CRANE ACROSS THE BURNING SANDS. SOME "PLEASANT" PICTURES PRINTED FOR THE ENTERTAINMENT AND ENLIGHTENMENT OF AMBITIOUS MASONS WHO SEEK THE SHRINERS' INITIATION.

HERE'S A NOVEL THEORY ON THE ORIGIN OF THE UNIVERSE.

Electrician Kinraide's Ideas of the Creation of the Sun, Moon, Stars and Planets.

Wonderful and Beautifully Constructed Apparatus the Work of Which Is Likely to Astonish the Electricians and Scientists of the Civilized World.

The remarkable series of photographs of electricity that are to be placed on exhibition during the coming week in the windows of the Old Corner Bookstore cannot fail to attract the attention of every passer-by. They have already called out unstinted admiration and have provoked the keenest professional interest on the part of the Boston scientists who have been privileged to see them. The general public will have the opportunity of seeing them probably on Wednesday of this week.

The exclusive story printed in last Sunday's Post told in a general way some facts shown by these truly marvellous pictures. The theory which has presented itself to Mr. Kinraide's mind as an outcome of his experiments in securing them is here told for the first time. It involves nothing less than a theory of the origin of the universe, suns, moons, stars and planets.

By reference to the plate numbered III. it will be seen that one electrical phenomenon takes the form of a comet. This is a union of the two manifestations of electricity, the positive and the negative, base to base, and, as stated in last Sunday's Post, has never before been seen. Mr. Kinraide has experimented in securing this particular form and has found out under what conditions it can be originated. Whenever he takes a notion now he can go into his dark room and make a shower of these beautiful electrical comets.

From other experiments he has made he knows that the feathery forms shooting out from the base of the triangular part of the comet is negative and that the nebulous tail is the positive.

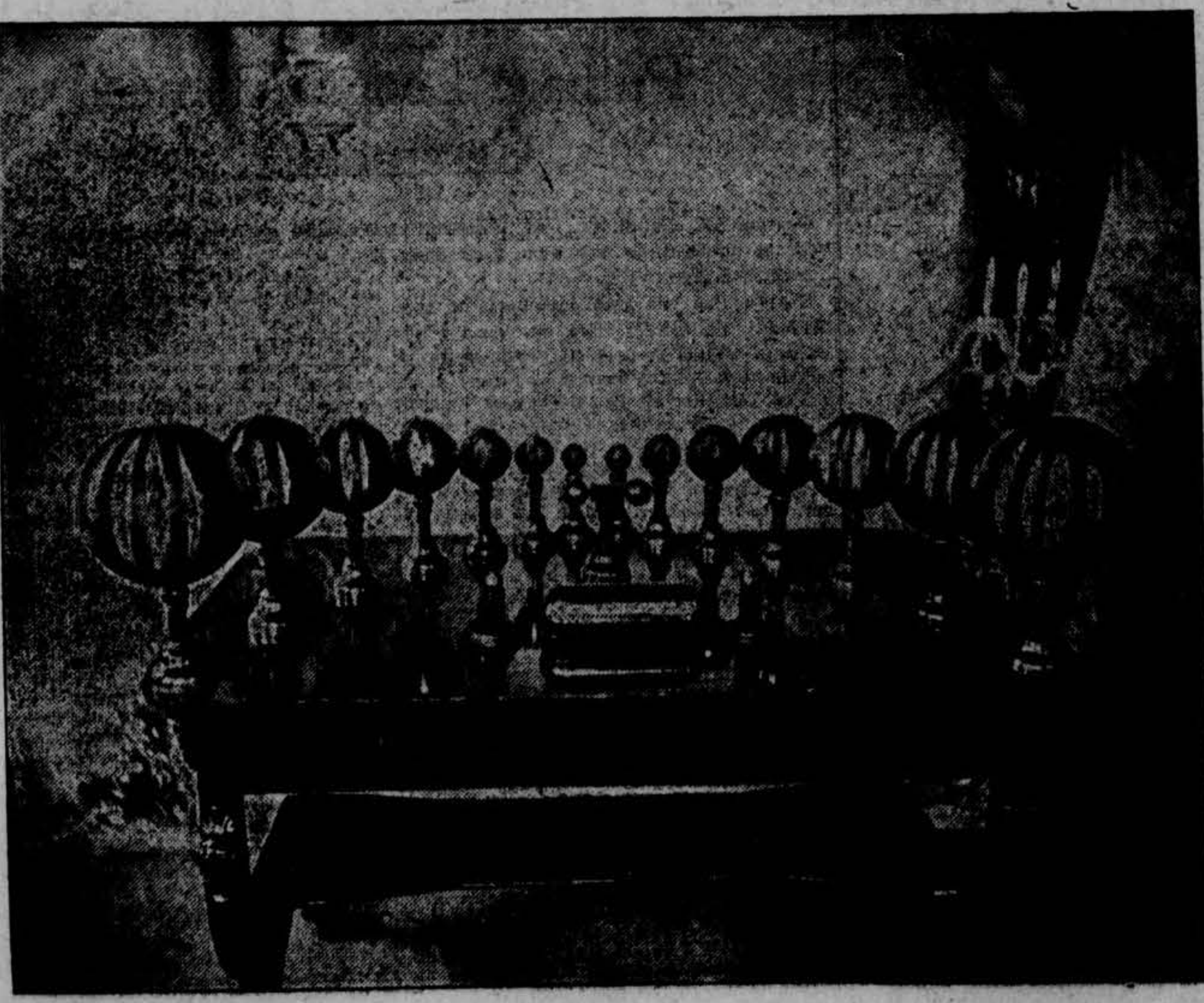
Mr. Kinraide claims that the conditions under which these comet forms are made in his laboratory are the same as those which must have existed millions of aeons ago, when what we may call the universe was in a state of chaos. That is, before the suns and stars were formed.

Of course, Mr. Kinraide reasons, under the same conditions similar results would follow. Then he explains what these results would be. In the first place, he assumes that before the worlds were formed electricity was present everywhere in cosmos. It was the only great physical force then operative. Primarily it then existed in a state of equilibrium.

For some reason or other, the equilibrium was disturbed and then electrical comets went swinging off into space. The negative, going ahead, would be followed in a headlong chase by its brother, positive, trying to catch up with it. For how many billions of leagues this great race may have gone on no one will attempt to say, nor for how many aeons it was kept up. But on and on the chase would sweep through space until something would stop it.

This is how Mr. Kinraide believes it would be stopped. He assumes that in the mad rush the electrical comet would attract to itself cosmic dust in much the same way that any static electrical machine in a laboratory will quickly gather to itself the motes in the air. As time went on this accretion of dust would grow greater and greater. Polarization of the particles of dust in the comet's path would ensue and it would whirl along like a great sweeping machine, gathering into itself whatever came in its way.

In time an enormous mass would be collected. Then the speed of the onrushing force would be retarded and the positive electricity would be able to overtake and unite with the negative.



SPHERES USED IN ELECTROGRAPHING.

They range from one inch to eight inches in diameter. Best results have been secured from the five and six-inch spheres.

FOR A LIFETIME HE HAS BEEN PROBING INTO THE MYSTERIES OF THE "NEW" FORCE

Formation of the World's Result of a Chase Over Billions of Leagues.

Electricity, He Claims, Was the First Great Physical Force Out of Which All Things Else Have Developed Since the Beginning of Time.

Then the cosmic dust, free to follow its own devices, would assume its natural, spherical condition. Thus the worlds were formed.

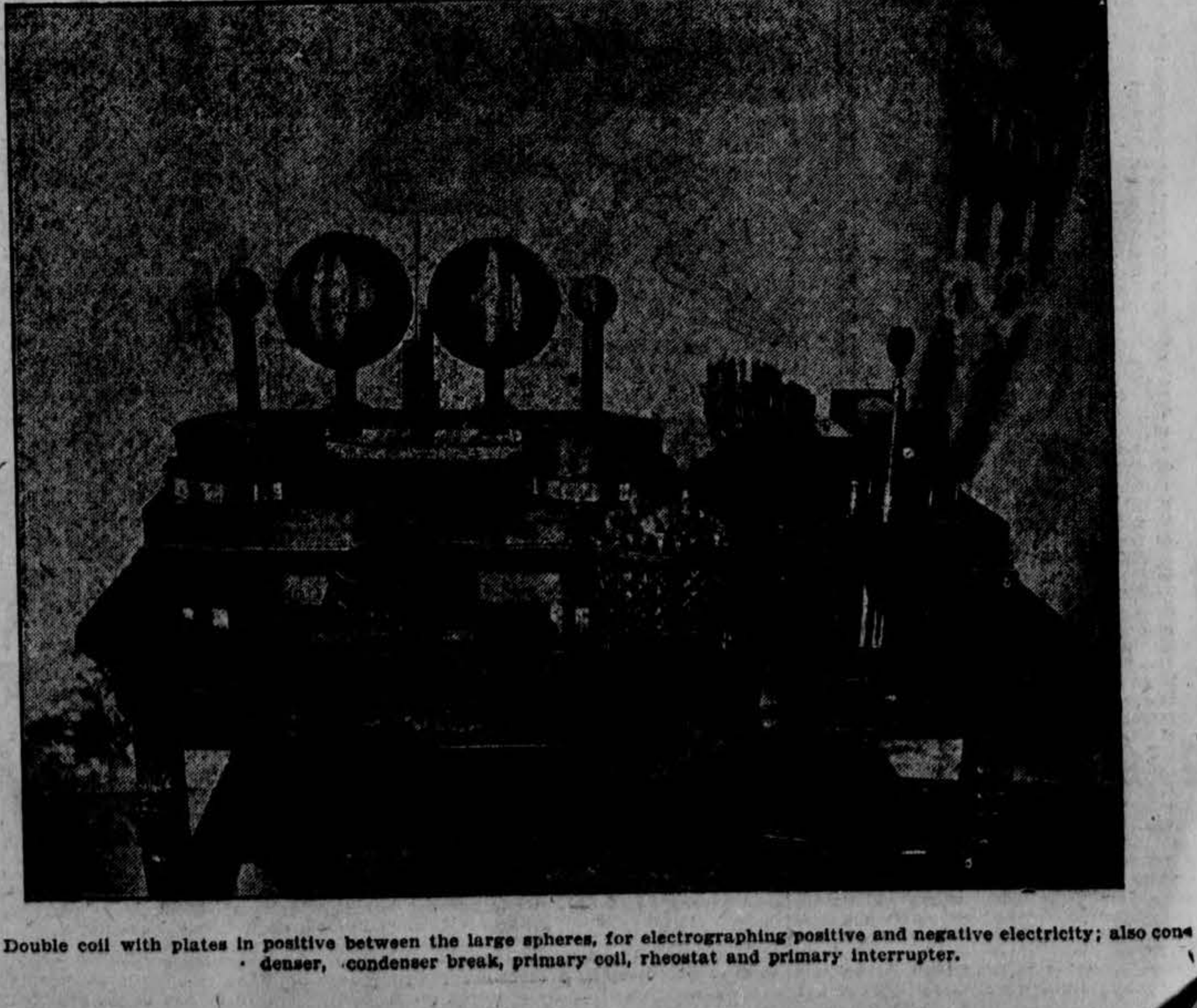
This, at least, is Mr. Kinraide's theory, based on the marvellous results he has secured in his study of this mighty force. He says that every plate he secures has some new proof for him. He does not claim that electricity was the life principle, but he believes it was the first great physical force out of which all things else have developed. Beautifully analogous to all things animate, it, though inanimate, has a two-part nature at least, a dual manifestation.

Mr. Kinraide takes a natural pride in his successful inventions, his X-ray apparatus and his wireless telegraphy devices, both of which are of direct commercial value, but the wonderful vistas of grandeur opening out before him along the line of this theory of the building of the universe so far eclipse in their absorbing interest all other phases of his study that to this he has given his deepest attention.

It seems perhaps far-fetched that from the study of protographic plates and of the conditions under which they were produced a man can base a theory of world building. But that is what Mr. Kinraide has done. Four years of closest study along this line have taught him wonderful facts, and the theory has worked itself out before his eyes, day by day, until it stands as clearly before him as any other law in nature. He appreciates the vastness of the ideas presented and watches their unfolding with deep reverence.

Mr. Kinraide has been interested in the study of electricity from boyhood. When he was only 10 years old he began experimenting. Most of his work has been along the line of independent investigation. He is yet a young man, and the world may rightly look to him for other marvellous discoveries.

ELECTROGRAPHING APPARATUS COMPLETE.
In securing the picture, the sensitive plate is balanced on the top of the sphere.



Double coil with plates in positive between the large spheres, for electrographing positive and negative electricity; also condenser, condenser break, primary coil, rheostat and primary interrupter.

Read the Want and Classified advts in today's Globe. Remember to order your advts for next Sunday's Globe today. Are you reading "Without Mercy?" You can begin it in today's Globe.

Boston Evening Globe
(Trade-Mark Registered)
Latest Evening Edition

VOL. XCVIII NO. 168
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BOSTON, WEDNESDAY EVENING, DECEMBER 15, 1920—20 PAGES—TWO CENTS
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7:30 FINAL---CLOSING STOCKS

THEFTS OF $300,000 CHARGED

BRITISH ATTEMPTED TO INFLUENCE SHIP BOARD

DENMAN TESTIFIES BEFORE COMMITTEE

Principal Reason Why He Quit as Chairman

WASHINGTON, Dec 15—Members of the British mission which visited the United States in 1917, attempted to influence the policies of the Shipping Board, William Denman of San Francisco, first chairman of the board, testified today before the House committee investigating the board's operations.

Mr Denman indicated that his insistence that the Shipping Board be free from British influence had more to do with his resignation as chairman of the board than any other one thing.

"Source of Interference"

In this connection the witness said that if he could obtain the permission of President Wilson for the disclosure of "certain phases" of Shipping Board negotiations, "one of the sources of interference with my administration as head of the board may be disclosed."

To support his charge of attempts of the British mission to influence the policies of the board, Mr Denman said that in April, 1917, when he was attempting to organize an administrative board in New York to function

Continued on the Tenth Page.

KINRAIDE'S SISTER TELLS OF SQUABBLES

Mrs Carpenter Warned Wife Her Mother Would Suffer—Inventor Called "Only a Figurehead"

By JOHN J. DONOVAN

BARNSTABLE, Dec 15—"He is only a figurehead and is only here to pay the bills," is what Mrs Kinraide said about her husband, according to Mrs Annette Carpenter, president of the Women's Alliance in Sandwich, who was the principal witness this morning in the Kinraide separate support action before Judge Raymond Hopkins in the Probate Court today.

Mrs Carpenter makes her home at the Hermitage, the Summer place of Thomas Kinraide, the Jamaica Plain inventor. She is also the sister of Mr Kinraide, and her testimony this morning was interesting.

Mrs Carpenter also said: "When I inquired why it was Mr Kinraide married Ethel Ford, Mrs Ford had told me that she, Mrs Ford, would not allow any one else to marry her daughter."

Mrs Carpenter said that she had been a resident of Sandwich since July, 1913. She said she had first met Mrs Ford in 1894 and that the meeting took place at Mrs Ford's home, 550 Columbus av, Boston.

In 1899, when Mrs Ford moved, it was feared Kinraide had softening of the brain and needed Mrs Ford, but she could not be in both places at once.

Changed Care of Homes

Witness said that she went to Boston and took charge of Mrs Ford's house at Columbus av and Mrs Ford went to Kinraide's home in Jamaica Plain. She said at the time Mrs Ford went to Ravens Croft there were in the Columbus-av house Mr Ames, Kendall, Richardson, Dearborn, Davidson, Mrs Ford's sister and the latter's young daughter. Some of the men, she said, were chemists assisting Mr Kinraide in his laboratory work.

According to the witness Mrs Ford was installed at the Jamaica Plain home and "became manager at the home in every shape and manner."

Asked regarding the personal appearance of the children at the Kinraide home, witness said that they often came to table with dirty hands and dirty faces and were very ill-mannered. She said that on several occasions her brother sent the children away from the table to be washed.

She referred to the time in 1913 when, it was alleged, Mr Kinraide threatened to throw one child out of the dining-room door. She said her brother took the child and started to the door, but Mrs Ford and Mrs Kinrade headed him off and took the child away from him. Kinraide left the room.

She said at the time there was a cook in the house, a second girl, a general girl for upstairs and a man to do the odd jobs around the house.

"If Mrs Ford Had Staid Away"

Witness also said that Mrs Kinraide had told her that if Mrs Ford had staid away, Mrs Kinraide and her husband could make up their differences much easier. Mrs Carpenter said Kinraide is a very good man and for weeks at a time was working at the shop and so busy that he came to the table in a flannel shirt, not having time to change his clothes. So he would simply throw on a linen coat.

Asked if Mrs Ford had told her about Kinraid seeing Mrs Ford she said Mrs Ford had told her several times that Kinraide feared her.

She was then questioned regarding July 21, the day upon which Mrs Ford left her home in Sandwich with her daughter and proceeded to bring action against Mr Kinraide.

She said that that morning Kinraide asked her to do work in his room which needed attention, and, she said, she started upstairs to the room, but that Mrs Ford met her and told her not to do the work. Witness said that she answered that her brother had asked her to do the work and she was going to do it. Witness said she took the pillows off the bed and then Mrs Kinraide came into the room and threw the pillows on the floor.

Final Scene Before Separation

She turned to Mrs Kinraide and remarked: "Ethel, you are making a big mistake. If this goes to court some one is going to suffer."

"Who will suffer?" Mrs Kinraide had asked.

"Mrs Ford will suffer."

Mrs Ford came into the room then and added: "Yes, Ethel, I have been Burton's mistress."

Mr Kinraide heard the argument and came in. It was at that point Mrs Kinraide, enraged, asked her husband, "Why didn't you marry my mother?"

Mrs Carpenter testified that Kinraide replied it was impossible, because she had such a temper, that she was quarrelsome, and that there were other things. Mrs Carpenter also said that she had understood that Mrs Ford had met Kinraide at a theosophical meeting and at that time she mentioned it to Mrs Ford, and Mrs Ford replied: "I never was in one in my life."

Mrs Carpenter continued, that Mrs Ford turned to her daughter and said: "Ethel, put on your clothes and we will go."

Mr Kinraide interfered and Mrs Ford

Continued on the Tenth Page.

Total Want and Classified advts printed during the 11 months ending November 30, Globe, 594,062; second paper, 86,479. Use the Globe's Want and Classified columns to get the best results.

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Pick
Contains all the ingredients for making a delicious
Home Beverage
Brewed from Choicest Malt and Hops
No Boiling
No Cooking
No Smell
Buy Pick in concentrated form and GET READY FOR CHRISTMAS
For sale by grocers nearly everywhere, 65 cents the quart can, or by mail 10c extra. D. F. RYAN, 390 Washington St., Cambridge, Mass.

Holiday Boxes
Bostonia Cigars
For the Christmas Trade. Put up in fancy cedar wood boxes of 25 and unusually handsome packs of 10. Sold by all first-class dealers. Made in Boston since 1879. Union made. Hand made. Guaranteed imported Havana filler.

Sure Relief
BELL-ANS FOR INDIGESTION 25 CENTS
6 BELL-ANS Hot water Sure Relief
BELL-ANS FOR INDIGESTION

FOR CHRISTMAS
BULL DOG SUSPENDERS
EACH PAIR IN A HANDSOME GIFT BOX

PLEASE HELP OUR OWN CHILDREN
WANTED NOW! $150,000 EMERGENCY FUND!
For deficit and running expenses of the Children's Hospital and Convalescent Home.
150 x $1000=$150,000
or 1,500 x $100=$150,000
or 6,000 x $25=$150,000
or 15,000 x $10=$150,000
or 30,000 x $5=$150,000
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Use the Best Medium
Advertise your Wants in the Daily and Sunday Globe.
During the 11 months ending November 30 the Globe printed 594,062 Want and Classified Advts. This was 507,583 more than were printed by the second Boston paper.
Advertisements for next Sunday's Globe should be ordered today.
Advertisers will please read and follow the directions printed below:
1—Until further notice advts under the following classifications must be in the office Friday to be sure of appearing in the following Sunday's Globe:
Machinery and Tools
Musical Instruments
Tours and Travel
Yachts, Boats, etc.
Furniture, etc.
Farm and Garden
Refrigerators, etc.
Poultry, Pigeons, etc.
Showcases, Desks, etc.
Typewriters, etc.
Safes, Cash Registers
Schools, Colleges, etc.
Dressmaking, Millinery, etc.
Want and Classified advts other than the above must be in the Globe office before 1:30 p. m. on Saturday.
2—Advts for the Daily Globe must be in the office before 9 o'clock of the day preceding publication.

Favorable Report on Teachers' Salary Bill

The Legislative Committee on Municipal Finance this afternoon reported favorably the bill of the Boston School Committee for an increase in the tax rate of Boston to increase the salaries of teachers and other employes of the School Committee, and to increase the amount of fuel and supplies.

There are, however, only five members recorded for the bill—Senator Weston of Newton, Senator Moulton of Pittsfield and Representatives Newhall of Lynn, Corbett of Lowell and Canty of Boston.

Representative Willard of Chelsea reserved his rights. The fact that he has done so allows the committee to make a favoraable report.

The five members opposed to the bill are Senator Christian Nelson of Worcester and Representatives Bates of Salem, Kidder of Cambridge, Bradbury of Lawrence and John E. Nelson of Quincy.

IRISH PRIEST SLAIN BY UNIFORMED MEN

LONDON, Dec 15—The Bishop of Cork, says the Central News, has received a telegram stating that Canon Magner, parish priest of Durmanway, County Cork, was shot dead by armed and uniformed men at 2:30 this afternoon.

HENRY F. LONG TO SUCCEED WILLIAM D. T. TREFRY

Governor Nominates His Secretary to Be Commissioner of Corporations and Taxation

HENRY F. LONG

Henry F. Long, private secretary of Gov Coolidge, was nominated by the Governor at today's meeting of the Executive Council to be Commissioner of Corporations and Taxation. Mr Long will succeed William D. T. Trefry of Marblehead, who has reached the retirement age. The position carries an annual salary of $6000.

The nomination was confirmed by the Executive Council, under suspension of the rules.

Mr Long has served in the executive office for five years in a secretarial capacity under Gov McCall and Gov Coolidge. He was a member of the House of Representatives for the years 1914 and 1915, being a member of the Committee on Water Supply in 1914, and a member of the Committee on Rules in 1915, of which he was also clerk, and chairman of the Committee on Public Service. Before coming to the Legislature he served the town of Topsfield, where he still resides, as Selectman, assessor, commissioner of trust funds and in other offices.

The preent incumbent of the office to which Mr Long has been named, William D. T. Trefry, has been in the State service for many years and for more than 20 years as tax commissioner. As Mr Trefry is nearly 70 years of age, the age at which the State law says all must retire from the State service, he was not eligible to fill out the term of three years which the office carries.

Mr Long will continue his work as secretary of Governor Coolidge until the expiration of the lattetr's term, Jan 6.

Other nominations sent into the Council were:

Arthur C. Coggeshell of New Bedford, associate member of the Commission for the Blind, vice Joseph P. Reynolds, deceased; Atherton Clark, Newton, trustee of the Massachusetts Agricultural College, vice Edmund Mortimer, who has removed from the State; Elizabeth E. Hormel, Boston, trustee Monson State Hospital, vice Mary E. Donahue, resigned; Frederick W. Ryan, Lynn, master in chancery, Essex County, reappointment, and Elmer D. Howe, Marlboro, trustee of the Massachusetts Agricultural College, reappointed.

FIRST DEPOSITOR GETS LOAN ON TIED-UP SAVINGS

Bankers' Committee at 166 Devonshire St Had Few Applicants This Morning

Parney Peterson of 346 Center st, Jamaica Plain, a depositor in the savings department of the Fidelity Trust Company, was the first today to avail himself of the privilege of borrowing 25 percent of his tied-up savings account from the bankers' saving loan committee, at its new rooms, opened today on the second floor at 166 Devonshire st. Peterson received $129.

It would appear from the small number of savings depositors who called at the four closed trust companies—the Hanover, the Cosmopopitan, the Fidelity and the Prudential—and at the loan committee's rooms today that few of the 80,000 depositors are expecting to avail themselves of the opportunity to borrow funds against their tied-up savings accounts.

Maybe this is because comparatively few of the 80,000 savings depositors in the four trust companies have received their notices from Bank Commissioner Allen's office. It was said today that he had sent out not more than 5000 or 6000 notices since Monday, because it is not desired or intended to send out such a large nuber at once as to cause a run on the banks and the new loan committee.

Already the procedure in the new enterprise is slightly bothersome, and difficulties are arising in connection with assignments of savings accounts. These are being straightened out as fast as they arise. Even now, after the entire procedure has been explained in the newspapers and in the circulars sent out by the Bank Commissioner, there are large numbers of the depositors who do not yet understand how to go about it to secure loans. Some have been calling at the banks today with their pass books, in the belief they can withdraw their funds at their own banks as of old, before the banks were closed by the Bank Commissioner. Some even have called at the loan committee's new rooms with this idea in mind.

Circular of Instructions

For the benefit of those who do not yet understand the procedure, the following circular of instructions has been forwarded to depositors in the closed trust companies:

"To the depositors in the savings departments of the Cosmopolitan, Fidelity, Hanover and Prudential Trust Companies:

"The committee appointed by the Boston banks, members of the Federal Reserve System, to arrange for loans to the depositors in the savings departments of the closed trust companies, has opened an office at 166 Devonshire st, second floor; hours, daily 9 to 3 p m, except Saturdays, 9 to 12 m.

"Loans will be made under the following regulations:

"1. Applicants for loans must first take their pass books and proof of claim to their respective trust companies and obtain from the agent of the Commissioner of Banks a duly executed certificate of proof of claim.

"2. The applicant will then take his certificate of proof of claim to the committee rooms, where he will sign a note for the amount to be borrowed, assigning his certificate of proof of claim as collateral for the note.

"3. This note will be drawn on demand, must have revenue stamp affixed, will carry 6 percent interest and will in no case be taken for an amount in excess of 25 percent of the proved claim.

"4. A receipt for the pledging of the certificate of proof of claim will be given by the committee which must be kept as evidence of the pledging of the

BANK PRES. THOMAS P. BEAL SR.

Continued on the Tenth Page.

THE WEATHER

United States Weather Bureau forecasts:

For Boston and its vicinity: Fair and somewhat colder tonight. Thursday fair, strong southwest to west wind.

For Southern New England: Cloudy tonight and Thursday; not much change in temperature; fresh to strong southwest wind.

For Northern New England: Cloudy tonight and Thursday; probably snow in north portion of Vermont, New Hampshire and Maine; colder tonight on the east Maine coast; fresh southwest wind.

For Eastern New York: Cloudy tonight and Thursday, with snow flurries in west and north portions; not much change in temperature; fresh to strong southwest wind.

Shippers should prepare 36-hour shipments north for temperatures of 26 to 30; west, 28 to 32; south, 32 to 35; Boston and vicinity, 30 to 34.

Temperatures at 8 a m: New England 32 to 42; New York City, 36; Washington, 42; Chicago, 32; St Paul, 22.

Boston observations at 8 a m: Barometer 29.47 inches; temperature 42, highest yesterday 56, lowest last night 42; humidity 65 percent; wind, southwest, 12 miles an hour; rainfall 0.82 inch; clear, sunshine yesterday, none.

Highland Light, 8 a m, clear, fresh southwest breeze.

The Temperature Today

The thermometer at Thompson's Spa records the temperature up to 3 p m today as follows:

	1919	1920		1919	1920
3 a m........	25	48	1 p m........	30	52
6 a m........	24	44	2 p m........	30	52
9 a m........	25	45	3 p m........	31	52
12 m........	29	50			

Florida, Five Through Trains Daily

Through Pullman from Boston daily. Atlantic Coast Line, 248 Wash. st., Boston. —Advertisement.

"Piper" Donovan's Son Hunts Deer in Natick Streets And Is Late For School

NATICK, Dec 15—Robert Donovan, son of the famous sprinter, Edward F. (Piper) Donovan, gave chase to a deer on West Central st yesterday afternoon. He first espied the animal looking in the windows of the home of Chairman of the School Committee Arthur L. Potter. The boy got quite near the animal before it became frightened. It made its way up West Central st with young Donovan close in pursuit.

Later, at the Pond-st School, several minutes after the last bell had rung, he explained to the teacher that he was late because he tried to catch a deer and bring it to school, as a few days previous the teacher had asked the pupils if they had ever seen one alive. The boy said he stayed right behind the animal until it started jumping fences and railroad tracks and finally disappeared into the woods in West Natick, just above Lake Cochituate.

EDWARD D. RICE, 70, IS ARRESTED

Cash Sums Alleged to Be Taken From Two Banks

Edward D. Rice, aged 70, of 233 Pond st, Jamaica Plain, was arrested this morning by Police Inspector Silas Waite of Police Headquarters, charged with the larceny of $300,000.

The money alleged to have been stolen by Mr Rice includes two items, amounting together to $150,000 in cash, from the National Shawmu Bank of this city.

The first of the items was $100,000, alleged to have been taken by Mr Rice on May 19 of this year. The second item of the charges lists $50,000, said to have been stolen on May 27 of this year. The third item cited is an amount of $150,000, taken from the New England Trust Company on Aug 15.

The police state that all of the money was in cash when taken. Rice was held in $10,000 this morning by the Municipal Court.

Edward D. Rice is given in the Boston Directory as chief owner of Edward E. Rice & Co, dyestuffs, at 620 Atlantic av, with houses at 233 Pond st, Jamaica Plain, and at Manchester, Mass.

Claim Books Were Falsified

Mr Rice is believed to have inherited the business from his father, Edward E. Rice.

The police allege that Mr Rice falsified his accounts and that the resulting financial statement which he made to the two banks in question led them to believe that his credit was good enough for a loan of $150,000 from each. The officials further charge that the statements made to the banks were false, and that the operation amounts to grand larceny. Auditors have been over the books of the firm, they assert, and their testimony will be offered at the trial.

It is understood that Edward E. Rice & Co were heavily involved in chemical importations during the war period, and that some of the difficulties developing since have been due to the demoralization of the market created by the war and the consequent interruption of trade.

GEORGE E. KEITH'S PUBLIC BEQUESTS TOTAL ABOUT $310,000

About $100,000 in Stock of His Company to Provide Pension Fund for Old Employes

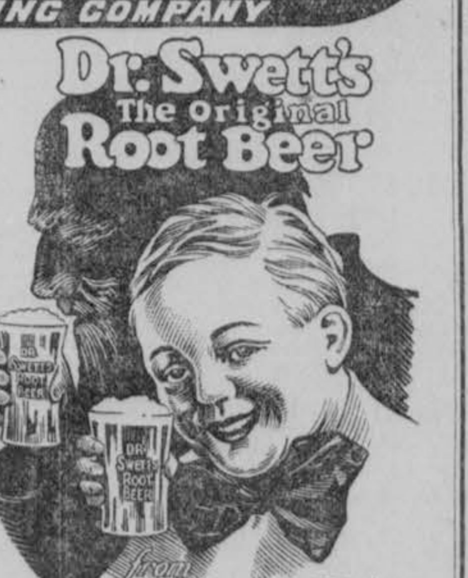
BROCKTON, Dec 15—In the public bequests in the will of George E. Keith, millionaire shoe manufacturer and head of the George E. Keith Company, who died last week, made known today by Judge Warren A. Reed, is one providing for a pension fund for his old employes.

Harold E. Keith, his only son; Myron L. Keith, an only brother; Edward A. Keith and Frank E. Packard are named trustees of a bequest of 1000 shares of second preferred stock of the company, the income for 20 years to be used to assist in pensioning old employes of the George E. Keith Company. At the end of 20 years these four trustees may continue the policy of pensioning, or may apply the money and income to such purposes as they deem fit.

Continued on the Tenth Page.

See your newsdealer or newsboy and place a regular order for the Daily and Sunday Globe. Order your advts for next Sunday's Globe today.

ANNOUNCEMENT
The Burkhardt BREWING COMPANY
Have Just Been Appointed Exclusive Official Bottlers and Distributors
For
In Eastern Mass., Maine, N. H. and Vermont



DR. SWETT ROOT BEER, INC.
Burkhardt Brewing Co., Station St., Boston 20

We Are Paying
$1,956,882.50
TO OUR CHRISTMAS CLUB MEMBERS
JOIN OUR 1921 CLUB NOW
$1.00 to $100.00 Per Week
Exchange Trust Company
Member Federal Reserve System
1 Court Street
124 Boylston Street

BOYS—
OUR SUNDAY, DEC. 19, MEETING
Will Be for Boys and Men
There Will Be Talks on
Football by Robert T. Fisher, Head Coach of the Harvard eleven.
Baseball by Kenneth L. Nash, Captain of the Brown nine, shortstop of the Cleveland American team, coach of the Tufts team.
Yachting by Charles F. Adams, Skipper of the Cup Defender Resolute.
Rowing by Leverett Saltonstall, Captian of the Harvard Henley crew, winner of the Grand Challenge Cup, 1914.
The Game of Life by Rev. Palfrey Perkins of Weston.
NO MAN WILL BE ADMITTED UNLESS HE BRINGS A BOY. EVERY BOY WILL BE ADMITTED WHO BRINGS A MAN. The meeting will begin promptly at 7:30. Tickets may be obtained without charge at
UNITY HOUSE
7 PARK SQ. BOSTON

Wise Bees Save Honey
Wise Folks Save Money
That Xmas Club Check You Get Today
Will start a savings account here. You can use part of it to
Join the
HOME SAVINGS BANK
1921 Christmas Club
You couldn't put it to more practical or profitable use. 4 classes—50c to $5.00 a week. Further details on request.
Home Savings Bank
Incorporated 1869
75 Tremont St., Boston

ADAMS HOUSE
LANDLORDS' DINNER
SUNDAYS—TWELVE to EIGHT
$2.00 Per Person
GEORGE G. HALL COMPANY

Next Sunday's Globe — Order the paper in advance from your newsdealer or newsboy. Many dealers were all sold out of the Globe last Sunday. Read the Want advertisements today.

Boston Evening Globe
(Trade-Mark Registered)

Latest Evening Edition

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7:30 FINAL---CLOSING STOCKS

PONZI CAUSES A COMMOTION

BRITISH MAY TRY TO CHECK DE VALERA

CONSIDERS REQUEST TO UNITED STATES

May Ask Official Notice of His Activities

LONDON, Dec 8 (by A. P.)—The British Government is considering whether it will request the United States Government, in the interests of Anglo-American friendship, to take official notice of the anti-British activities in America of Eamon de Valera, according to a statement made today by Andrew Bonar Law in the House of Commons, in response to questions.

Horatio Bottomley, Liberal, later asked whether the time had not arrived when Great Britain should make serious respresentations to the American Government that any further toleration of de Valera and the conferring on him of municipal honors constituted an unfriendly act. This was greeted by cries of "No!"

Mr Bonar Law answered: "I think there is no doubt that we would, from the diplomatic point of view, have the right to take the course suggested, but it is not a question of a right, but what is expedient."

Responding to another query, Mr Bonar Law said:

"Undoubtedly a very severe campaign is being conducted in America against this country, but so far we have found the Americans can be trusted to look at the matter from a reasonable point of view."

LOUIS S. BROWN OF MASS. GENERAL DIES

Louis S. Brown, microphotographer at the Massachusetts General Hospital for many years, died at the hospital today, after an illness of several days from pneumonia. Mr Brown was one of a few men that are experts in that line of photography and his contributions to medical science have been numerous.

"WITHOUT MERCY"—Be sure to read the opening chapter of this great story in next Friday's Globe. Tell your neighbors about it.

WHAT TO GIVE
PERFUMERY
Beautiful Dainty Sets for "My Lady's Boudoir"
Largest Assortment in New England
Your Inspection Invited
S. S. PIERCE CO.
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REVISION OF TAX LAWS URGED BY SEC HOUSTON

He Asks Congress to Repeal Some and Enact Others Increasing Levy on Luxuries

SEC HOUSTON'S PARTING VOLLEY AT TAXPAYERS

Sec Houston recommends:

Increase in normal tax on incomes below $5000, from 4 to 6 percent, and on incomes from $5000 to $10,000 from 8 to 12 percent.

Repeal of excess profits tax and levy on corporation profits of 20 percent, with additional 6 percent tax on corporation income.

Tax of 2 cents a gallon on gasoline.

Federal license of 50 cents per horsepower on automobiles, with an additional sales tax on autos, except trucks and wagons.

Additional 10 percent tax on theatrical admissions.

Heavy additional taxes on cigarettes, cigars, tobacco, snuff, chewing gum, toilet soap, toilet powder, jewelry, musical instruments and moving picture films.

Substitution of 10 percent tax on manufacturers, producers or importers of perfumes, cosmetics and medicinal articles, in place of present tax on consumer.

Abolishment of tax on soda fountain and similar beverages.

Revision of surtaxes on incomes.

Creation of new $10,000 job in Treasury Department and increases in salaries of assistant secretaries.

WASHINGTON, Dec 8—Immediate revision of the Nation's tax laws on the basis of an annual levy of $4,000,000,000 for a period of four years, and including an increase of 2 percent in the taxes on incomes up to $5000, is urged by Sec Houston in his annual report sent today to Congress.

Repeal of the excess profits taxes, elimination of certain of the so-called luxury taxes, including the levy on soda fountain and similar beverages, and a readjustment of the rates in the higher groups of income taxes, is proposed by the Treasury chief. To meet the losses brought about by these proposed changes, Mr Houston recommends revised and new taxes to yield about $2,000,000 as follows:

Tax on Corporation Profits

A tax of 20 percent on corporation profits, distributed or undistributed, in addition to application of a higher surtax rate to yield $690,000,000.

An additional tax of 6 percent on corporation incomes to yield $465,000,000.

Readjustment of surtax rates on incomes to yield an additional $230,000,000.

Abolishment of the $2000 exemption allowed corporations on income, to yield $58,000,000.

An increase from the present 4 percent to 6 percent in the tax on incomes of $5000 or less and from 8 percent to 12 percent in the tax on incomes between $5000 and $10,000, the whole estimated to yield $150,940,000 annually.

A tax of two cents a gallon on gasoline for motor cars and all other purposes, to yield $90,000,000.

Urges Tax on Automobiles

A Federal license tax of 50 cents per horsepower on the use of motor cars to yield $100,000,000.

An additional sales tax on automobiles (other than truck and wagons) and motorcycles and motor car accessories to yield $100,000,000.

A 10 percent additional tax on theatrical admissions to yield $70,000,000.

An additional tax of $2 per thousand on cigarettes to yield $70,000,000.

An additional tax of 25 cents per thousand on cigars to yield $5,000,000.

An additional tax of five cents per pound on tobacco and snuff to yield $8,000,000.

An additional tax of 5 percent on candy to yield $20,000,000.

An additional tax of 7 percent on chewing gum to yield $2,000,000.

An additional tax of 7 percent on toilet soap and toilet soap powders to yield $4,000,000.

A 10 percent tax on the sale by manufacturers, producers or importers of perfumes, cosmetics and medicinal articles in lieu of the present tax on the consumer to yield $10,000,000.

An additional 5 percent tax on jewelry and precious metals to yield $25,000,000.

An additional tax of 5 percent on musical instruments to yield $13,000,000.

An additional tax of 5 percent

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THE WEATHER

United States Weather Bureau forecasts:

For Boston and its vicinity: Fair tonight and Thursday; not much change in temperature; fresh north and northeast wind.

For Southern New England and Eastern New York: Partly cloudy tonight and Thursday; little change in temperature; fresh north and northeast wind.

For Northern New England: Fair tonight and Thursday; somewhat colder tonight; moderate to fresh northwest and north wind.

Shippers should prepare 36-hour shipments north for temperatures of 12 to 18; west, 15 to 20; south, 26 to 30; Boston and its vicinity, 24 to 28.

Temperatures at 8 a m: New England, 16 to 26; New York city, 28; Washington, 32; Chicago, 34; Denver, 20.

Boston observations at 8 a m: Barometer, 30.22 inches; temperature, 27; highest yesterday 41, lowest last night 26; humidity, 82 percent; clear; wind north, 10 miles an hour; rainfall none; sunshine yesterday, 93 percent.

Highland Light, 8 a m: Cloudy, light north breeze.

The Temperature

The thermometer at Thompson's Spa records the temperature up to 12 m today as follows:

	1919	1920		1919	1920
3 a m........	41	30	1 p m........	49	39
6 a m........	39	29	2 p m........	49	39
9 a m........	42	31	3 p m........	49	39
12 m........	46	38			

Pinehurst N. C.

25th Anniversary Season. Golf and all other sports. Thru Pullman daily from New York.—Advertisement.

Real Estate

The Globe printed **68,893 more Real Estate** advts during the 11 months ending November 30 than the second Boston paper.

Help Wanted

During the 11 months ending November 30, the Globe printed **160,485 more Help Wanted advts** than the second Boston paper.

Read the want and classified advts in today's Globe. Order your advts for next Sunday's Globe at the earliest possible time.

Advertisers will please read the directions printed below:

1—Until further notice advts under the following classifications must be in the office Friday to be sure of appearing in the following Sunday's Globe:

Machinery and Tools
Musical Instruments
Tours and Travel
Yachts, Boats, etc.
Furniture, etc.
Farm and Garden
Refrigerators, etc.
Poultry, Pigeons, etc.
Showcases, Desks, etc.
Typewriters, etc.
Safes, Cash Registers
Schools, Colleges, etc.
Dressmaking, Millinery, etc.

Want and Classified advts other than the above must be in the Globe office before 1:30 p. m. on Saturday.

2—Advts for the Daily Globe must be in the office before 9 o'clock of the day preceding publication.

Publicity Clears City Hall Annex Corridor

American Peace Trip Cost $1,651,191.09

WASHINGTON, Dec 8—A special message giving the complete expenses of the American Peace Commission during its work abroad was transmitted to the Senate today by President Wilson.

Total expenditures amounted to $1,651,191.09 from Dec 1, 1918, to Dec 4, 1920. The amount actually paid out was $1,703,712.06, but repayments and gains in exchange reduced this by $52,520.97.

Some of the items were:

Travel and subsistence, $28,442.

Subsistence, $193,629.

Salaries, $200,871.

Wages of employes at Hotel Crillon, $131,507.

Rents, $176,853.

Food, hotel and kitchen supplies, $283,560.

Hire and laundering of linen at hotel, $64,969.

Damage and loss of property at hotel, $125,870.

Missions to Russia, Germany, Posen, Turkey, Holland and Armenia, $239,726.

Purchase of automobiles amounted $14,602.

Confidential expenses of Presidential party, $17,534.

Col E. M. House and Henry White, the statement showed, received monthly salaries of $1000 as commissioners, while Robert Lansing, former Secretary of State, and Gen Tasker H. Bliss, other commissioners, had their actual expenses paid.

END OF SCANDALOUS CONDITIONS THERE

At Mayor Peters' direction, Supt of Public Buildings Fred J. Kneeland was in conference with Capt Sullivan of the Court-sq Station this afternoon with the aim of making an arrangement that would end permanently scandalous conditions that have long existed on the City Hall Annex street-floor corridor.

Mr Peters told reporters that a special plain clothes policeman investigated conditions there yesterday afternoon and that he is awaiting the report from this man.

The Mayor thinks it may be necessary to station another policeman in the corridor, if the throng which made the place its hangout is to be routed permanently. One policeman and an elevator superintendent are now stationed there; it is believed that another policeman would help keep the place clear.

Ten policemen couldn't have done a more effective cleanup job than was realized today by the devotion of a little newspaper ink to the problem. Loafers who had daily carried on an iniquitous traffic there in booze and drugs shrank from the spotlight which Mayor Peters' investigation had turned upon them overnight.

An election department official, whose sense of humor is well developed, told reporters that everybody he chanced to see in the corridor today seemed to have a definite objective in mind—nobody was to be seen who at all resembled the evicted hangers-on.

Mayor Peters had received complaints that pedlers of liquor and narcotic drugs, political panhandlers, race track handbook makers and curb brokers in somewhat shady business were making the corridor their hangout and insulting people having real business there by their comments. He has ordered an investigation and better policing of the corridor.

WILD SCENES IN CAMBRIDGE COURT

Hot Verbal Exchanges in Italian With Crowd

Charles Ponzi today showed his old-time form when brought into the old Probate Court at East Cambridge, where a meeting of his creditors was held for the purpose of electing new trustees for the final settlement of the claims against the bankrupt money manipulator.

The moment he appeared in the courtroom pandemonium broke loose. Crowds jamming the corridors and the room in which the hearing was to be conducted shouted and yelled at Ponzi in Italian. He answered back in the same tongue.

Deputy Sheriff Fairbairn, son of the sheriff at the jail, accompanied United States Deputy Marshal Quinn as custodian of Ponzi and they had to take precautions the moment the two forces met face to face.

Ponzi Starts Exhibition

Insults and advice, suggestions by Ponzi to his victims, denunciation and abuse were hurled from scores of lips and from the pugnacious little Italian. The import of the remarks cannot be told in print.

Attempts to quiet the courtroom proved fruitless at times. Ponzi was sworn and immediately began to give an exhibition. The result was that

Continued on the Second Page.

McCARTHY ADMITS NO LIQUOR WAS SEIZED

"Supposed It Was," When Disclaimer Was Filed in Anderson Case, He Tells the Court

William J. McCarthy, Federal prohibition agent, during a severe cross-examination before Judge Morton in the United States District Court this morning, relating to his official acts regarding the seizure of liquors of one Michael Anderson of Haverhill, admitted that although a disclaimer was filed in the case declaring the liquors held under the revenue laws, he learned later that no seizure had been made by the local collector of internal revenue, as represented.

Instructions to file the disclaimer, he said, were given as a result of a telegraphic request sent by him to Washington asking the seizure of one barrel of the liquor and a verbal request to Collector Mitchell's office to seize the rest. On the supposition that the liquor would be immediately seized, he allowed the disclaimer to be filed.

Attorney Thomas I. Hogan, counsel for Anderson, subjected McCarthy to a severe gruelling as to his official acts relating to the Anderson liquors, and Judge Morton also took a hand in the examination.

The liquors in question were seized by McCarthy's men, with Sergt Gavin of the Haverhill police on May 29, last. United States Commissioner Hayes dismissed the complaint. Attorney Hogan then brought petition for a writ of mandamus to compel forfeiture proceedings and if possible recover the liquor. At the hearing of Sept 30, continued from the 28th, a disclaimer was filed by McCarthy disclaiming right to hold the liquors under prohibition laws, but pointing out that the liquors were in violation of Internal Revenue laws and were so held.

Subsequently, the United States attorney petitioned to withdraw the disclaimer, admitting that he was informed that the liquors had not been seized by the internal revenue collector when the disclaimer was filed. Later Judge Morton ordered a writ of mandamus to bring forfeiture proceedings. Today's hearing was on Mr McCarthy's petition to recall this writ, as the liquors have now all been seized by Collector Mitchell and are in his hands.

Mr McCarthy's testimony was to the effect that the liquors were originally seized under him both as prohibition agent and internal revenue agent, but the liquor was detained under his prohibition authority for further action under the revenue laws. During his sickness in Washington, he said, whatever was done was done by Mr Horgan. Witness maintained he had discussed with Asst U. S. Atty Backus several times the legal status of these and other liquors.

It was then brought out that on Sept 29, the day after the first hearing on the writ, Mr McCarthy wired Washington asking that the local collector be directed to seize one barrel, or a part of the liquor, and about 4 p m that day he verbally asked legal representative Henchey of the collector's department to seize the rest. On the supposition that it was all going to be seized, the disclaimer saying all the liquor was held under the revenue laws, was filed.

"Let's see," interrupted the court, "all you had done was to wire Mr Kramer asking that one barrel of the liquor be seized, and spoken to Mr Henchey asking that the Collector seize the rest, and yet on the next day, Sept 30, you allowed the District Attorney to tell me that all the liquor had been seized."

"Yes, because I thought so," said the witness.

"But you did, in effect, come in here and make the statement that it was all seized?"

"Yes, because I was of the opinion that it was."

Mr McCarthy said he did not know until about Oct 10 that actually none of the liquor represented in the disclaimer as being held under the internal revenue laws had actually been seized. Then he informed attorney Horgan to take the matter up with Asst Dist Atty Louis Goldberg, he said.

"You put it up to Horgan to straighten out this tangle?" interposed the judge.

"Yes."

Witness said he had also called Prohibition Commissioner Kramer's office on the phone when he learned that no seizure had been made, as instructed.

Prohibition Agent McCarthy Was Ill In Hospital Two Months Last Summer

That William J. McCarthy, Federal prohibition agent in Boston, was sick in a Washington hospital for more than two months last Summer when there was great mystery as to the reason for his absence from the city, was brought out this morning in testimony given before Judge Morton in the United States District Court.

Mr McCarthy admitted the fact of his severe illness during a stiff grilling at the hands of Thomas I. Hogan, counsel for Michael Anderson, in a hearing on the legal status of Anderson's liquors which have already caused much litigation. Chief McCarthy said he was taken ill in June, was confined to the hospital during all of July, came to his Boston office for a single day in August and again was off until the middle of September.

Following the noon recess Mr McCarthy's legal assistant, Herbert F. Horgan, declared:

"Mr McCarthy was sick on his back in Washington, packed in ice. He had nervous prostration due to the great responsibility of his office and overwork. This fact was kept from the public because we knew that if the rum-runners found it out New England would be run wild with moonshiners and bootleggers."

THE STORY OF A MOTHER'S VENGEANCE

"WITHOUT MERCY"

BEGINS NEXT FRIDAY IN THE BOSTON GLOBE

MRS KINRAIDE FOUND DICTAGRAPH IN HOME

Traced Wires to Kinraide's Shop, Tore Them Down—Mrs Ford Says Kinraide Threw Powder at Her

BARNSTABLE, Dec 8—The separate support action of Mrs Ethel S. Kinraide against her husband, Thomas B. Kinraide, scientist and inventor of Spring Park av, Jamaica Plain, was resumed this morning before Judge Raymond Hopkins in the Probate Court.

At the close of yesterday's hearing, Mrs Rachel Ford, mother of Mrs Kinraide, had not been dismissed from direct examination. She was the second witness today.

The first was Dr Bush, family physician for about 14 years. Dr Bush said that he had been called to treat Kinraide and found him in the condition apparently caused by over-indulgence in drinking.

Mrs Ford then resumed the stand and told of her daughter, Mrs Kinraide, discovering a dictagraph in the house and that in last March they traced the dires to Mr Kinraide's shop and tore them from the wall.

She also said that there was a copper kettle with a hose attached to it and from which was dripping a fluid sometimes of pale color which was sometimes and cloudy another. She said that in the laboratory there was also three 10-gallon tanks of molasses.

Threw Powder at Her

On direct examination Mrs Ford said that on one occasion Mr Kinraide threw a ca nof powder at her ,the contents of a can of powder at her, the contents of which scattered all over her clothing.

When this incident happened Mrs Ford said, "Shame on you" to Kinraide, who in reply told her to "get out of there,." she said, "which I did."

Asked if she had heard Kinraide call his wife any names, she repeated a number of them, some of which follow: 'Hell cat," "she-devil," "bone and hank of hair," "vampire," "low," and the sun should not shine on her but she should go out at night."

Witness was then turned over to Atty Morse for cross-extmination, who asked her if during the 30 years that she knew Kinraide, did she hear him call his wife any other names.

Mrs Ford answered, "haven't I told you enough?"

Atty Morse then asked Mrs Ford if it was not true that the first time she met Kinraide she was in a place resorted to by men for imoral purposes.

Judge Hopkins then ordered the time on the examination and said that he could see no reason for going back over 30 years.

Mr Morse said that he proposed to show the facts, as this was his case and he proposed to show the relations of Mrs Ford with Kinraide.

Mrs Ford denied that she was in a hotel with Kinraide when she was found by her sister to notify her that her husband had committed suicide. She said that she had been to a theatre that evening with Kinraide.

Attorney Ford then asked her how old Kinraide was when she first met him. The witness replied that she was 35, and that Kinraide was about 27. Attorney Morse said: "Wasn't he about 22?" and she said, "No, 27."

Pressed again as to where it was she met Kinraide, Mrs Ford said that it was at the headquarters of the Keeley Motor.

Kincaide Was Good to Witness

Kepley was supposed to have invented a perpetual motion motor, which amazed experts and on which investors lost thousands of dollars. The witness said she was there to watch a demonstration of the motor. During further cross examination she admitted that Kinraide had advanced her $150 to help bury her husband, but never asked her to return the money.

Mr Morse then referred to the time when Kinraide, while experimenting, burned the 12-year-old girl, who later became his wife. Sheadmitted he was

Continued on the Second Page.

MALDEN GIRL HIT BY SHOT FROM REVOLVER

Mystery in Affair at De Pauw University, Where She Is a Sophomore

MALDEN, Dec 8—Mystery surrounds the circumstances of the shooting of Miss Hilda Varney, the 20-year-old daughter of Mr and Mrs W. S. Varney of 48 Crescent av, Malden, at Green Castle, Ind, where she is a sophomore at DePauw University.

The girl was not seriously wounded, according to word received by her parents, the bullet hitting the fleshy part of her right shoulder. It was reported from the university that Miss Varney was walking with another girl student from the Kappa sorority house, when she was wounded by a revolver shot, believed to have been fired by a man.

Miss Varney is a graduate of Malden High School in 1918. She is a close friend of Miss May Hughes, daughter of Bishop Edwin H. Hughes of this city, formerly president of DePauw University, and it was the friendship between the girls that led Miss Varney to become a student at DePauw.

MICKEY SHANNON DIES IN HOSPITAL

Never Conscious After Knockout by Roberts

JERSEY CITY, N J, Dec 8—Mickey Shannon, a heavyweight boxer of Pittsburg, who was knocked out in a bout here last night with Al Roberts of Staten Island, died in the City Hospital today.

Shannon received the fatal blow in the sixth round, suffering internal hemorrhages at the base of the skull. He never regained consciousness.

Roberts was arrested on a charge of atrocious assault and battery upon leaving the ring, but was paroled in custody of his manager, Billy Gibson, pending the outcome of Shannon's injury. At that time County Judge Richard Doherty, who granted the parole, said in case of Shannon's death Roberts would be held for manslaughter.

Roberts was arraigned today on a charge of manslaughter and allowed to sign his own bond for $2500.

Shannon was once a pupil at the Staunton Military Academy of West Virginia and a member of its football team. During the war he was a lieutenant in the army. Recently he had been a metallurgist with the Carnegie Steel Company at Pittsburg.

Last night's fight was his 10th of any importance.

Shannon's true name was Raymond McMillan.

WINTHROP WOMAN HELD UP BY BANDITS

WINTHROP, Dec 6—Mrs Isadore Swartz, who together with her husband and sons, operates a chain of army goods stores in Boston was the victim of a bold hold-up early this morning in front of her home at 409 Shirley st. This fact, however, did not leak out until late this afternoon.

Mrs Swartz arrived at the Winthrop Beach station of the Boston, Revere Beach and Lynn Railroad a few minutes after 12 o'clock and walked along Shirley st toward her home. As she approached the Dream Theatre, which is directly across the street from the Beach Fire Station, she noticed an automobile, with the side curtains down, stopped at the curbing.

As she reached a point abreast of the car a masked man leaped out, snatched the pocketbook which she carried on her arm, and leaping back into the machine was whisked away at a rapid speed.

Nels R. Nelson, a special police officer, who was passing on the further sidewalk on his way home heard the woman's scream and rushed to her assistance, but before he could reach the other sidewalk the highwayman's car had got under way. Mrs Swartz was badly frightened and was assisted to her home.

Nelson telephoned to Police Headquarters and the alarm was sent to East Boston and Reve, together with the description of the machine, but the thieves apparently escaped.

According to the police, however, the thieves did not get what they set out for. It is believed that they mistook Mrs Swartz for her daughter, who carries home the proceeds of the day's sales at the Hanover-st store. The daughter arrived on a train later and almost collapsed when told of the incident. The men got only $3 in the elder Mrs Swartz' pocketbook.

Chief of Police William A. McNeill is of the opinion that the holdup was the work of a professional gang, operating in Boston and vicinity. He is convinced that they had watched Miss Swortz leave the store with the money and hurried to Winthrop to waylay her, but arrived a little too soon.

Rubber Plant

"What did you say Mr Goppit does?"

"He operates what you might call a sweat shop."

"A slave driver, eh?"

"No, he's the proprietor of a Turkish bath."—Birmingham Age-Herald.

Sure Relief
BELL-ANS FOR INDIGESTION 25 CENTS
6 BELL-ANS Hot water Sure Relief
BELL-ANS FOR INDIGESTION

Filene's Automatic Bargain BASEMENT

just unpacked with hundreds of toys and other bargain gifts—ready Thursday at 9

212 women's dresses $10.75

$10.75 for this velours dress, brown in hue, contrasted with tan, wooly embroidery—211 others just as good looking.

LOOK what's here for $10.75!

64 satins
18 charmeuses
12 tricotines
48 serges
70 velours

our plan
Every lot must sell quickly or take
¼ reduction after 12 selling days
½ reduction after 18 selling days
¾ reduction after 24 selling days
goods given away after 30 selling days

Wish you could have been eavesdropping when these dresses were being made ready for the racks and heard the exclamations of how good they are at $10.75 by folks who see values every day!

Dresses with panels, embroidery, raffia, pleats, tunics, in fact dresses with all the seasonal style features and many colors. All bargains!

even some few-of-a-kind SAMPLES for early comers!

HUNDREDS OF OTHER BARGAIN LOTS—NO MAIL ORDERS

PONZI CAUSES A COMMOTION

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the oath administered was one of the most peculiar oaths ever administered in a court in this State.

Ponzi insisted on interrupting every two or three words with "yes, sir," and with comment on the theme of the oath whenever any phrase of it struck his fancy. He paid no attention to the attempts of the officials to make him orderly.

Uproar Again Breaks Out

The proceedings again became quiet enough for the business at hand—the selection of the trustees—to be brought up for consideration. Immediately Ponzi began on a new tack.

From the crowded benches of the courtroom insistent advice came flowing at the top of people's lungs. Ponzi's own attitude in the matter of selecting new trustees was one of bitter opposition to what he believed was the possibility of selection of men hostile to him.

Finally, when the matter had been threshed out for a few minutes, Ponzi told the authorities that if the trustees who were selected were satisfactory to him he would help them.

Here the uproar again broke out.

Ponzi Hustled Out

Ponzi tried to make a speech to his creditors. The officials who were with him tried to check him. The immediate result of this was a wrangle, which lasted for two or three minutes.

For the next several minutes after Ponzi repeatedly attempted to gain the floor, apparently under the impression that it was a sort of a Congressional hearing and, if he could manage to get recognition from the presiding official, he would be able to make one of his famous "announcements."

The matters finally got so stirred up and the situation in the courtroom became so threatening, that Ponzi was hustled out of the room between the two sheriffs and almost at a run was conducted clear of the spectators back to the jail.

His exit was marked by wildest excitement. On the way out Ponzi shouted in Italian to his creditors, "'Don't vote for trustees unless they are favorable to me." There were more shouts in Italian in reply.

Calls Thurston Politician

As Ponzi passed the doorway, Trustee Thurston, who figured prominently in the receivership hearings, said: "That's all you are going to say today, Charley. You've said about enough."

"To hell with you, you dirty cheap politician," was the answer made by the unsmiling Charles.

At the session it became apparent that the Attorney General has again stepped into the case.

The present tangle is being handled largely by the Legal Aid Society. Ponzi objects to this.

The Attorney General wants the present trustees renamed. Ponzi insists that they be all "fired" and new ones appointed.

Ponzi's Slate

His slate consists of one lawyer of reputation in Boston, one reputable Boston business man and Mr Rittenhouse, who assisted at the Attorney General's office during the tabulation of claims and notes which took place there after the Ponzi "blow up."

Vincent Brogna, a prominent North End Italian lawyer, and a former Representative, was at the court with documents and authority to represent a group of about 2500 creditors.

In view of the fact that his clients' claims represent $1,478,000 it is believed that he will be named one of the trustees.

Another lawyer, Louis Schwartz, was also present with claims from 2600 creditors. The result of the various groups of creditors is a fight for position on the trusteeship, on which about every one of the many groups wants to have a representative.

Ponzi, after this morning's uproar, will not be brought back to the court unless some unforeseen difficulties arise in the straightening out of the tangle.

Receivers in Conference

The three Ponzi receivers went into conference in the clerk's office with attorney Schwartz of Lawrence and afterward it was reported in the courtroom that they had induced him to give them his support in behalf of a trusteeship.

It is said that attorney Schwartz had told some of the attorneys that he had been requested by the Attorney General to take part in these proceedings as a private citizen, and to give his support to the election of the present receivers as trustees.

The foreign-born creditors, most of whom are Italian, objected strenuously before Referee Warner to the proceedings and particularly to the present receivers, all serving as trustees, claiming that they should also be represented on this board.

After the votes on the question of trusteeship were in the hands of Referee Warner, attorney Frank M. Zottoli, an Italian appearing for part of the Italian creditors, asked to have the whole proceeding postponed.

He said that he wanted an opportunity to examine every one of the votes which were qualified, and he claimed that a great many of the creditors had cast their votes under a misapprehension.

"The Legal Aid Society, he said, was charging 50 cents for drawing papers for the creditors who went to the society for assistance, and wanted 10 percent of the money ultimately received from the trustees by the creditors.

He said that the present receivers, the Ponzi Creditors' Protective Association and the Legal Aid Society were working together, and apparently had succeeded in getting control of the situation, to the disadvantage of the majority of the Italian creditors.

Referee to Examine Votes

He said he wanted an opportunity to duly examine every one of the votes which had been qualified, and that he would file objections to every claim put in except those put in by himself.

Atty Martin Witte then said that he himself would not make any such objections and atty Wasserman objected to atty Zottoli's claim. Then they all asked that they be given an opportunity to examine every one of the claims and their qualification before any announcement in regard to the selection of trustees was made.

Referee Warner at this point made it very clear to the attorneys that under the law he could examine and disallow any of the claims he had already allowed, and he said that it was his duty to examine the votes and get an idea of just how they stood on the matter of a trusteeship.

Then after that he said he would be willing to hear anything the attorneys might have to say on the question of allowing or disallowing claims or the question of an election of the receivers, before he approved the votes.

"We must have some receivers," he said, "in order that we may not destroy this estate. There must not be further delay."

In explanation of this he said that the receivers cannot pursue the large assets, which it is understood are out and cannot be reclaimed to the advantage of the creditors. Therefore, he said, trustees must be elected as soon as possible so as to make it possible to go after these assets which have not been collected.

It is apparent that the Attorney General, receivers, the Ponzi Protective Association and the Legal Aid Society have control of the situation, and it appears probable that the present receivers will be elected trustees to Ponzi in bankruptcy.

Receivers Received 4000 Votes

Referee Warner continued the session without any stop for luncheon, counting the votes. It developed that the present receivers received the votes of 4000 claims for trustees, and Vincent Brogna received 1632 votes for himself alone, and 835 votes in combination with others, making a total vote for himself of 2467 votes.

Referee Warner is now trying to find out how much the claims represented by the votes amount to, as this figures in the result of the election, which is decided not only by the number of votes but by the amount of claims.

State Senator Cassasa of Revere immediately filed a protest with the referee, saying that there were 10 women in the room who had given a certain lawyer their proved claims, but did not give him their vote, but that he had voted for the trustees on their claim, and that they wanted to exercise their right of casting their vote.

Referee Warner asked why they did not vote when he called for votes, and he said that they did not understand the procedure.

Atty Cassassa and Zottoli are making arrangements to hire a hall in Lawrence in order to call a protest meeting of all the creditors in that city and to ascertain how many of them gave Atty Schwartz authority to vote. They charge that these men gave Schwartz their claims but not their authority to vote.

MRS KINRAIDE FOUND DICTAGRAPH IN HOME

Continued From the First Page.

regretful over the accident and that in order that the young girl might be protected from future suffering he offered to mary her.

Asked if the daughter did not want to marry him, why she desired it, witness answered: "Because Mr Kinraide wanted her."

Pressed for the real reason, Mrs Ford replied that she thought Kinraide would be better to her daughter than anyone else on earth, as he was remarkably good to her, giving her everything she needed.

Mr Morse then asked how reconciliations could be made and why Kinraide complained that only two 17-cent loaves of bread were on his butcher's bill when $30 were spent for mushrooms. Mrs Ford replied she didn't know.

Providence Lawyer Found Guilty of Contempt and Suspended from Practice

PROVIDENCE, Dec 8—William G. Troy of Providence was found guilty of contempt of court in statements relative to Supreme Court judgeships, and was suspended from practice today by order of the Supreme Court of the State.

The court had heard testimony and arguments concerning a speech made by the lawyer during a campaign rally in Woonsocket last month, in which, it was alleged, he had declared seats on the Supreme Bench were for sale.

By order of the court today, at the end of two years Mr Troy may apply to be reinstated as a member of the bar of the State.

N. E. WATERWORKS MEN IN SESSION

Heear Talk on the Supply Service of Geneva

The monthly meting of the New England Water Works Association was held at the Copley Square Hotel this afternoon. Luncheon was served at 1 o'clock and was followed by addresses by several well known engineers and water men.

A meeting of the executive committee was held at headquarters at the Tremont Temple at 11 o'clock this morning and various business topics were discussed.

In the afternoon the 100 members who were present were addressed by M A. Betant, engineer and director of the water supply service of Geneva, who gave a very interesting talk on "The Water Supply of Geneva, Switzerland," after an introduction by Prof George C. Whipple of the Harvard Engineering School.

There was also a general discussion of "Cleaning and Painting Standpipes," which was opened by Charles W. Sherman of Metcalf & Eddy, consulting engineers, and who was followed by Prof Harold K. Barrow, consulting engineer.

One of the features of the meeting was the exhibition of the electrical thawing device for pipes, which was made by William Bonnar of the Boston Water Department.

Henry V. Macksey of Framingham, the president of the association was the presiding officer.

No Question as to the BEST CORN FLAKES when you have your first taste of POST TOASTIES

These flakes bear a distinctive name because of their distinctive quality

They are meant to—and do excel in every way

That is why Post Toasties are the POPULAR CORN FLAKES IN AMERICA

Sold by grocers everywhere!

Made by
Postum Cereal Company, Inc., Battle Creek, Mich.

REVISION OF TAX LAWS URGED

Continued on the Second Page.

on motion picture films to yield $4,000,000.

Would Tax Income and Outgo

In the readjustment of surtaxes, Mr Houston proposes the division of incomes into "saved or reinvested," and "spent." On the former class, he would limit the highest tax to 20 percent, while the income spent would be subjected to a tax ranging as high as 50 percent.

Under the plan proposed by the secretary, incomes between $5000 and $6000 would be taxed 2 percent on the part saved and the same on the part spent. The same ratio with a graduated increase would apply to incomes up to $30,000, where the maximum of 20 percent on saved income is reached. From $30,000 to $40,000, the rates would be 20 percent on saved and 25 percent on spent; $40,000 to $50,000, 20 percent and 30 percent; $50,000 to $75,000, 20 percent and 35 percent; $75,000 to $100,000, 20 percent and 40 percent, and over $100,000, 20 percent and 50 percent or a total tax of 70 percent.

The present maximum rate is 70 percent on incomes of $1,000,000, but Mr Houston declares it has "long passed the point of its minimum productivity," since it encourages the investment in tax-exempt securities. He says the "only effective way to tax the rich is to adopt rates that do not force investment in tax-exempt securities."

The new rates, while not laying as high a levy against the great incomes will, the secretary expects, produce a greater return to the Government, since the wealthy will not find it profitable to invest in bonds of States, countries or municipalities which are tax exempt, but pay a lower rate of interest.

Consumption Taxes Unwise

Regarding a consumption tax, Sec Houston says: "In my opinion, it would be neither wise nor expedient to increase radically the volume of consumption taxes. What should be sought are a few consumption taxes which tap the surplus income which is being wasted, not a conglomerate multiplication of petty taxes upon every article of luxurious or unnecessary consumption which can neither be clearly defined, cheaply collected nor administered without widespread evasion."

The excess profits tax, Mr Houston declares, has not fulfilled the theoretical grounds upon which it was enacted and has been found to be wrong both in theory and in political philosophy. He says it discriminated against the conservatively financed corporation while aiding materially the firms whose capitalization is exaggerated. He urges that it be replaced by some form of a corporation profits tax.

Mr Houston again urges the necessity for rigid economy in Government expenditure, asserting that only by conserving the finances carefully can the expenditures be kept within $4,000,000,000 annually.

Would Not Refund Debt

An analysis of the Government expenditures for the last fiscal year developed the fact that almost one-fifth of the $6,400,000,000 paid out was spent in connection with Federal control and the guaranty of earnings for the railroads.

Only one department of the Government — the War Department — spent more than was used in connection with the carriers. The War Department's total, the record shows, was $1,611,000,000 against $1,087,000,000 for the railroads.

Discussing the war debt and a program for its retirement, Mr Houston says that within the next 30 months the Government will have to pay off approximately $7,500,000,000 in Victory Notes, War Savings Certificates and Treasury certificates of indebtedness. He proposed that the Treasury certificates be not funded further; that they be retired as rapidly as the Treasury's conditions permit.

Railroad Burden Heavy

Mr Houston tells Congress that the heavy payments required by the Transportation act "disarranged the Government's fiscal plans," but he believes early Spring will witness final settlement of the claims of the railroads under the guaranty provisions, and that the Treasury then can proceed with its previously announced program of meeting and retiring the war savings certificates, amounting to $800,000,000, and the Victory note issue, which aggregates $4,500,000,000.

Through operations of the sinking fund, use of the small payments by foreign Governments on loans, and the employment of certain salvage returns to the Treasury, it has retired $1,764,896,150 in bonds, Mr Houston says, saving $100,000,000 on the transactions by buying in the open markets. Of the amount purchased, bonds aggregating $119,109,000 were retired from funds repaid by the foreign Governments.

The Secretary asks that the position of Under Secretary of the Treasury be created at a salary of $10,000. He recommends also an increase in the salaries of the assistant secretaries from $5000 to $7500. Mr Houston strongly urged the establishment of a Federal budget system.

Reviewing the loans to foreign Governments, Mr Houston says the American Government advanced in cash between April 24, 1917, and Nov 15, 1920, a total of $9,580,823,677. Of this amount approximately $163,000,000 has been advanced since Nov 15, 1919, under credits previously established to five foreign Governments. Of this France received $110,000,000, Italy $20,416,000, Greece, $15,000,000, Belgium $10,479,000, and Czecho-Slovakia $8,566,000.

Filene's

Tricolette blouses. Navy and brown, $5.

Dimity blouses, Leyden collars, $3.

Bisque, orchid, flesh, white. Crepe de Chine and Georgette blouses, $5.

Orchid, bisque, pink, blue. Leyden collar.

Silk blouses $5 sketched above

Hundreds of these and other blouses in almost every silk one can name—crepe de Chine, tricolette, pongee, Georgette. Tieback and Van Dyke frills particularly good.

Lingerie blouses $3 sketched above

1500 crisp new cotton blouses, in orchid, pink, blue, bisque, white. Many styles. Note the new Leyden collar style, a modification of the Pilgrim fashions of 1620.

All of them at the prices women most want to pay—$3 and $5!

(Filene's—mail orders filled—fifth floor)

LEGISLATURE ADMITS TEACHERS' PAY BILL

Limited Town Meeting Measure Also Let In

Both branches of the Legislature today admitted, for consideration at the present special session, the bills to provide additional pay for school teachers and other employes of the Boston School Committee; to allow limited town meetings in municipalities of 12,000 or more inhabitants and to allow women to hold public office in Brookline.

Each branch was in session about an hour. The principal business was consideration of the consolidation of the General Laws. The Senate, without debate, gave a second reading to chapters 1 to 132 inclusive. In the House there was discussion over the chapter relating to telephone and telegraph companies.

On that Mr Webster of Boxford moved to strike out a section relating to the recovery of damages from a telegraph company in case of a person's running into a telegraph pole standing by the roadside. He said that the law was passed in the '50's and is "absurd," in view of the fact that no such obligation exists in case of an electric light pole.

Mr Monk of Watertown asked Mr Webster to prove his case, but no response was forthcoming. After two decisions by the Chair that the amendment was lost by voice vote, Mr Abbott of Haverhill got a rising vote and there were 53 yeas and 19 nays.

CHEAP SWINDLE ON MESSENGER BOYS

Man Sends Them on Errands and Holds Their Bundles

If you are sending out any bundles to friends by messenger boys, or by your own boy, tell them to be on the look-out for a very generous man who will offer the lad 20 cents to deliver a note in a building while he "minds" the boy's bundle until he returns.

It was learned today at Police Head quarters, also at one of the messenger service offices, that more than one "generous" man is around the city offering to hold the messenger's package while he has a chance to make 20 cents by just delivering a note in "that building over there."

Up in the Back Bay a few days ago a messenger did accept 20 cents from a man to deliver a note while he took charge of the boy's bundle which contained merchandise valued at $35. The lad never saw the man until he accepted his 20 cents and hasn't seen him since.

On North st this morning Willie Condon, a bright boy employed by a messenger service company had a chance to make 20 cents in the same way, but he refused to give up the parcel he had, saying it wasn't heavy and he would look out for it himself. He never had the chance after that to make the 20 cents, as the man insisted in "minding" the package until Willie returned.

The bundle Willie Condon was out to deliver C. O. D. was valued at $34.

One of the inspectors at headquarters said that publicity of this will ruin the man's scheme and help those who are sending around Christmas presents by their own boys, as well as messengers in the service.

ARE YOU LOOKING far enough ahead to be willing to do without some things now for the sake of having them with interest later on?
WARREN INST'N FOR SAVINGS
(Established 1829)
3 Park St., Opposite the Common
Next Interest Day Dec. 14
Recent Dividends at the Rate of 4½%

Cuticura Soap
—SHAVES—
Without Mug
Cuticura Soap is the favorite for safety razor shaving.

RELAXATION OF NAVAL RULE IN SANTO DOMINGO

WASHINGTON, Dec 8—Relaxation of the naval administration in Santo Domingo has been decided upon by the American Government.

A decree providing for an extension of local government control is in preparation at the State Department, it was announced today, and will be promulgated soon.

Gift Bonds
Street Floor

Filene

Glove Bonds
Street Floor

10109

The Filene Gift Bond

This certificate entitles the holder to purchase merchandise to the amount of VOID Dollars when presented at any department.

Boston

Wm. Filene's Sons Co.

VOID

Give a Gift Bond

A GIFT BOND is really the gift of gifts. It enables the recipient to do his or her own choosing in any kind of Filene merchandise.

And it is exchangeable AFTER Christmas!

Use the Globe's Want and Classified columns to get the best results. See that your Real Estate, Business Chances and Automobile advts appear in tomorrow's and Thursday's Globe. Read the Wants today.

The Boston Daily Globe

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TWO CENTS

"WITHOUT MERCY"—Are you reading this great story? Remember, to be sure of your copy of the Daily and Sunday Globe it is necessary that you order the paper regularly from your newsdealer.

ELECTIONS TODAY IN 16 BAY STATE CITIES

Mrs. Daggett's Race For Mayoralty In Attleboro of Chief Interest

Boston Will Elect Three Councilors and Two Members of School Committee

Elections will be held today in 16 Massachusetts cities, but in only 11 of them will Mayors be chosen, the chief executives in the other five holding over for the coming year.

Among the latter is Boston, in which the election is confined to the City Council and School Committee. The other cities not electing a Mayor this year are Lawrence, Lowell, Lynn and Newton.

WHERE ELECTIONS ARE HELD TODAY

Elections will be held today in the following cities:

Attleboro	Malden
Boston	Medford
Beverly	Melrose
Chelsea	Newton
Everett	North Adams
Lawrence	Revere
Lowell	Woburn
Lynn	Worcester

The most interesting contest is that in Attleboro where Mrs Eliza G. Daggett is a candidate for Mayor in a field of five. She has the distinction of being the only woman to aspire to the office of Mayor in any city in the State. She is running in opposition to Mayor Brady, who seeks reelection. The other candidates are Samuel Holman, William Saart and George A. Sweeney.

In Boston the voters will choose three members of the City Council and two members of the School Committee, each to serve three years.

Thirteen Candidates for Council

There are 13 candidates for the three places in the City Council, and their names will be on the ballot in the following order: Dennis F. Reardon of 88 Calumet st, Daniel W. Lane of 291 Beacon st, John J. O'Hare of 61 Robinwood av, Daniel J. McDonald of 41 High st, Thomas J. Ball of 42 Gleason st, James T. Moriarty of 280 Dorchester st, Thomas A. Elston of 54 Bushnell st, Patrick H. Shanahan of 146 N st, Daniel C. Murphy

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ASKS FOR TIME ON IRISH TRUCE

Acting Sinn Fein Head Replies to Premier

Fr O'Flanagan Would Consult De Valera and Griffith

Mayor of Cork Is Called by Fire Inquiry Board

LONDON, Dec 13—Rev Michael O'Flanagan, acting president of the Sinn Fein, has requested Premier Lloyd George for time in which to consult with Eamonn de Valera and Arthur Griffith respecting the endeavors now being made to bring about a truce in Ireland.

Fr O'Flanagan made this request in reply to a letter from the Premier, in which Mr Lloyd George, responding to the first proposal looking to a truce, said the British Government did not lag behind any section of the Irish people in the desire that Ireland should enjoy the blessings of peace and prosperity and was prepared to offer facilities for a complete discussion of the whole situation.

Seeking the cooperation of the Government to this end, Fr O'Flanagan said:

"In the meantime I ask that you personally join with me in an appeal to all parties concerned in this struggle to allow at this opportune time of the year the spirit of the founder of our civilization to mitigate their anger toward one another, that the desire for peace may have root and grow in the hearts of two neighboring Nations that ought to live in harmony and mutual helpfulness."

Summoned on Accusing Crown Forces

As a result of direct charges that the Crown forces were committing various atrocities in Ireland, the Lord Mayor of Cork, with the Irish Commoners, Roch and J. J. Walsh, will be summoned before the military board investigating the fires in Cork Saturday night.

The charges were brought before the House of Commons tonight by Commander Joseph M. Kenworthy, who demanded that an impartial tribunal be set up to give an unprejudiced report of what happened. Commander Kenworthy

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READY TO HAVE WIFE GO HOME

Mother-In-Law Barred, Says Kinraide

Inventor's Testimony at Barnstable Ends

Denies Story Told by Mrs Rachel Ford

By JOHN J. DONOVAN

BARNSTABLE, Dec 13—Thomas Burton Kinraide, Jamaica Plain inventor, today told the Probate Court that he is willing to have his wife, Ethel S. Kinraide, who is suing him for separate support, return to his home, and said he will maintain her and treat her courteously and with respect, but not if her mother, Mrs Rachel Ford, attempts to return with her.

The declaration came at the end of the direct examination by his chief counsel, William A. Morse. Kinraide had been on the stand practically a full court day, though his examination was interrupted from time to time by the placing on the stand of character witnesses anxious to get home.

Attorney William C. Adams created a slight ripple of excitement when at the close of the long examination of Mr Kinraide he announced that there would not be any cross-examination.

Denies Charges Made by Wife

Many denials were made during the morning session by Mr Kinraide of allegations made by his wife. Among other things he declared that since his marriage he never has had improper relations at any time or any place. Though the action for separate maintenance was based on cruel and abusive treatment charges, his wife did not leave him, according to her own testimony, until after she had been told by her mother of alleged relations with Kinraide, before and after his marriage to Mrs Ford's daughter. Mrs Kinraide told the court in her examination, both direct and cross, that she believed her mother's story. Today Kinraide denied its truth.

Another important feature of the testimony today was a denial by Kinraide that it was not until July 21 of this year that his wife for the first time learned of the intimacy that existed between him and his wife's mother. The

Continued on the Tenth Page.

WOMAN RESIGNS JOB ON NEW YORK FORCE

"Treated Like Dog," Says Ellen O'Grady—Finds Too Much Politics to Suit Her

MRS ELLEN O'GRADY.

NEW YORK, Dec 13—Mrs Ellen A. O'Grady, Deputy Police Commissioner of New York City, today resigned, asserting that she had been hampered in her work and could not remain in her place and retain her self respect. Her action followed attacks on the efficiency of the department made by several newspapers.

Mrs O'Grady, who said she had handed Police Commissioner Enright her badge and announced she was leaving, in a statement to the press, charged that she had been "treated like a dog" by the commissioner since January, 1919, when she and her women detectives "tried to arrest men in his office for outrageous treatment to girls."

Mrs O'Grady, who declared she had "a thousand and one things to tell about the Police Department later on," said in her statement:

"I have been told that my work is too strenuous looking after the morals of girls in moving picture houses, and told to go slow. When my detectives went to enforce the law in a number of moving picture houses, the managers showed them receipts stating that they had contributed to the police hospital fund, and they had been promised that no police action would be taken against them."

Complaints Ignored

Mrs O'Grady charged that no attention was paid to complaints lodged with the bureau of missing persons and that she was unable to assign women for this work, because they had been taken from her for the police hospital drive.

Both Commissioner Enright and Mayor Hylan refused her request for an automobile, she added:

"It is a crime on the public to let incompetent people and puppets run the Police Department as it is being run today," she said. "There seems to be nothing but politics in the department, but they can't use me in politics."

Mrs O'Grady was appointed in 1918 by Commissioner Enright.

Mrs O'Grady's daughter, Florence who was her assistant secretary, also resigned, and both "walked out together."

Commissioner Enright immediately placed another commissioner in Mrs O'Grady offices to "see that nothing was taken out of them," Mrs O'Grady said. He is Third Deputy Commissioner Joseph A. Faurot, who will remain in charge until Mrs O'Grady's successor is appointed.

Enright Denies Charges

Commissioner Enright denied categorically everything unpleasant Mrs O'Grady said when she quit.

Mr Enright denied ever having interfered with Mrs O'Grady's work on enforcement of the law in motion picture houses.

"Mrs O'Grady did not resign," the commissioner added. "She just bounded into my office, threw her police shield on my desk and said: 'I am through.' Before I had time to ask her what it was all about she left the place."

MANY MILLS TO REDUCE WAGES

Cut Affects 100,000 in New England

Cotton Operatives Are Ones Hit Hardest

New Scale Effective Dec 20 in Some Plants

A reduction of wages to approximately what they were a year ago last November was announced yesterday for approximately 100,000 of the 300,000 textile workers in New England. The announced wage cut is about 22½ percent.

In Lowell, Lawrence, New Bedford and centers of the industry in Maine and Rhode Island notices to this effect were posted yesterday. In most places the reduced wages will become effective Monday, and while the cotton goods mills are for the most part the ones affected, the worsted operatives are involved in a few instances.

While only about one-third of the textile workers of New England are so far affected, the indications are that other cotton manufacturers will fall into line. It is not known whether the larger woolen mills will take such action at present.

In reality the reduction cancels two increases granted during the past year, one of 12½ percent and another of 10 percent. Lowell manufacturers said that under the new scale the average wage of a mill worker in that city will be $21 a week.

Reduction of wages in the extensive cotton mills at Fall River is being discussed by manufacturers and labor leaders.

After the announcement of the wage reductions for cotton operatives yesterday, William M. Wood, president of the American Woolen Company, said he had no word to add to his statement of several days ago that the directors of that company, which operates 50 mills, have not considered the matter of wage reductions.

NEW BEDFORD UNIONS TO ASK CONFERENCE

NEW BEDFORD, Dec 13—At a meeting of the New Bedford Textile Council tonight action was taken on the reduction in wages of 22½ percent in the cotton mills, notices having been posted in all the mills today.

It was voted to seek a conference with the manufacturers not later than Thursday night, to which time the council meeting adjourned.

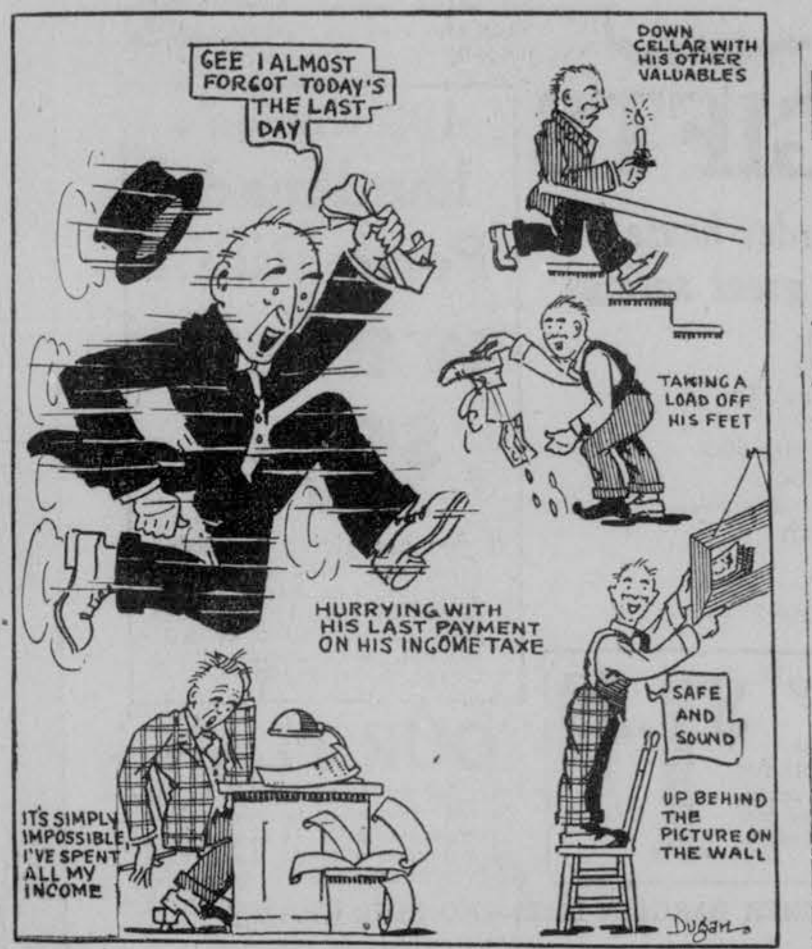
In anticipation that a conference might be granted, the executive board of the council was appointed a committee to represent the council at the conference.

It was said that many of the labor leaders considered the cut too radical and one secretary suggested that the cut be accepted under protest, but this was voted down. Many of the mills

Continued on the Sixth Page.

DIGGING UP MONEY FOR UNCLE SAM'S TAX

Everyone Scurrying to Find Cash For Final Payments on Income and Profit Levies Tomorrow



GEE I ALMOST FORGOT TODAY'S THE LAST DAY
DOWN CELLAR WITH HIS OTHER VALUABLES
TAKING A LOAD OFF HIS FEET
HURRYING WITH HIS LAST PAYMENT ON HIS INCOME TAXE
SAFE AND SOUND
UP BEHIND THE PICTURE ON THE WALL
IT'S SIMPLY IMPOSSIBLE I'VE SPENT ALL MY INCOME
Dugan

ANY TIME, ANY PLACE, TODAY.

Mail Clogged With Checks

Many Sell Stocks to "Raise the Wind"

Values Drop Sharply as Flood Increases

Sum of $840,000,000 Due Government

The fourth and final payments on income and excess profit taxes for 1920 fall due tomorrow. This instalment will aggregate about $840,000,000, which will be offset by the maturity of $700,000,000, in round numbers, of Treasury certificates.

There will also fall due the interest on Liberty Bonds, and while these big transactions are taking place there will be a considerable strain on the banks of the country, but it will be only temporary.

Meanwhile there is a grand scramble and much scratching of gravel by business concerns and individuals who have not paid their final quarterly instalment of the income and excess profits taxes, for all payments will have to be in the hands of the collector of internal revenue, John J. Mitchell, before midnight, Wednesday, or in the mail, so as to be postmarked Dec 15.

In the financial district, as well as throughout the business district generally, many followers of the forlorn hope that the Government might mitigate the sting by postponing payment, have been selling securities to raise the necessary cash.

This movement has been offered recently as an explanation of the heavy liquidation which has featured market dealings generally, since the Gov-

Continued on the Sixth Page.

DORCHESTER MAN "CROWNS" BANDIT

Gets Him to Lower Weapon by Ruse—Roxbury Holdup Victim Causes Arrest of Suspects

Joseph Haley of 54 Templeton st, Dorchester, reported to the police of the Fields Corner Station, last nigh, that while he was on his way home he was held up by an armed man.

Haley says he was approached at Adams and Gibson sts, Ashmont, by a lone bandit, who pushed a revolver in his face with a demand for money.

Haley threw up his hands when he was ordered to do so by the robber and offered the information that his money was safely tucked away deep ni his clothes. He also suggested that they step into a narrow areaway while he

Continued on the Tenth Page.

FIVE-YEAR TERM FOR HOLDUP MAN

Arthur Mosher Convicted of Robbery While Armed

Laid in Wait for Store Keeper at Latter's South End Home

New York Men Sentenced for Having Burglars' Tools

Arthur Mosher, the first of the men indicted for robbery last week to go to trial, was found guilty by a jury in the Superior Criminal Court yesterday before Judge Brown and sentenced to State Prison for a term of five to seven years.

Dist Atty Pelletier has ordered the vigorous prosecution of robbery cases, especially where gunmen are involved. Asst Dist Atty Mancovitz prosecuted Mosher on a charge of robbery, being armed.

The defendant held up George Caley at his home in Hudson st and robbed him at the point of a revolver. Caley made a grab at the weapon and it was discharged, the bullet passing through Caley's overcoat.

Caley has a store at Appleton and Berkeley sts. The defendant watched him one night and followed him home. The next night he waited in the door of Caley's home and pointed a revolver at Caley when he arrived there. That was Nov 23.

Mosher said he went into the doorway to tie his shoestring. He denied he had a revolver or that he robbed or attempted to rob Caley.

Gerald Barker pleaded guilty to breaking and entering a pawnshop and stealing revolvers and other articles. He was sentenced to the Reformatory.

William Bryne and James Sutherland, suspected of being New York crooks, arrived in Boston Nov 16 and the next day were arrested with burglars' tools in their possession. On pleas of guilty they were sentenced to the House of Correction for 12 months and nine months respectively.

Orrin Holmes, charged with an assault with a blackjack with intent to rob, pleaded guilty. The case went over till next week for sentence.

TODAY'S GLOBE CONTENTS

Page 1.

People digging down to raise money for Uncle Sam's taxes due tomorrow.

Sixteen cities hold elections today.

Joseph Haley, held up in Dorchester, gets bandit to lower revolver by ruse, jams highwayman's hat over his eyes and escapes; Hyman J. Shoffer, Roxbury storekeeper, recognizes on street two men who held him up Nov 30 and causes arrest.

Woman deputy police commissioner in New York resigns.

Fr O'Flanagan, acting head of Sinn Fein, asks Premier Lloyd George for more time to consult De Valera and Griffith on question of a truce in Ireland.

Kinraide tells court he is willing to have wife return home, but that mother-in-law is barred.

Arthur Mosher sentenced to serve five to seven years in State Prison for holdup of South End storekeeper.

New England mills announce wage reductions which will affect 100,000 operatives.

Two trusties escape in boat from Deer Island.

Page 2.

B. U. Union's clubhouse formally opened.

Cutter Ossipee towing the steamer West Wauneke to port.

United States passport to be given Peter MacSwiney to return, when he explains satisfactorily how he left United States for England.

New York postal clerks adopt stowaway cat which traveled 3000 miles in mail bag.

New Shiping Board may have to serve a while without salaries.

Williams, a seaman, and Dietrickson, a steward, arrested on charge of stealing $10,000 gold cigar casket from Charles M. Schwab's home and selling it in Germany.

Page 4.

City officials at Quincy given salary raises.

TODAY'S GLOBE CONTENTS

Page 4.

Constantine declares he will not abdicate the throne of Greece.

Page 5.

Richard Pattee, president of New England Milk Producers' Association, tells Milk Inspectors' Association the farmers' views.

Port of Boston.

Marriage intentions.

Page 6.

Further consolidation of railroads is advocated in addresses at dinner in New York to S. Davies Warfield; Congressman Esch and Myron T. Herrick speak. Mr Warfield says New England systems need special treatment.

Jury to try Arthur Mudgett, alleged slayer of Amy Shonio, partly selected at Hyde Park, Vt.

Rev Dr Nehemiah Boynton resigns Brooklyn pastorate to be a "minister-at-large."

Torso of woman found floating in New York Bay.

Plan to sell municipal lighting plant at Wakefield is defeated.

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New England Purchasing agents have Christmas jollification.

Railroads begin to show effect of August rate raise.

Military Board may pass on mental soundness of Capt Willers, accused of being deserter and spy.

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Financial news.

Page 9.

Cotton crop the largest since 1914.

Financial and commercial news.

Bankers' committee arranges for making loans to depositors in savings departments of closed trust companies.

Page 10.

Christian Science trustees in New York explain dismissals.

United States Supreme Court sustains several convictions on charges of opposing war measures.

House passes Immigration bill and repeal of war laws, and Senate adopts resolution to revive War Finance Corporation.

Page 11.

Gompers warns labor to oppose compulsory arbitration laws.

Police drag Muddy River in Fenway because of belief Miss Maud M. Daniels may have ended life there.

Page 12.

"The Newest Ocean," by Uncle Dudley.

"Our First Immigrants," by Charles J. Merrill.

Daniels says United States must have biggest navy unless all great Powers agree to reduce armaments.

Legislature may not finish up before next week.

Page 13.

Household Department.

Page 14.

Nearly half of America's overseas trade carried in American ships.

Dr Marion Edwards Park, now dean of Simmons College, is appointed dean of Radcliffe.

"Strangler" Lewis wins world's heavyweight catch-as-catch-can wrestling championship.

TWO TRUSTIES AT DEER ISLAND ESCAPE

Break Lock on Boat and Row Over Shirley Gut

When the guards at Deer Island rounded up the prisoners for the night about 8:30 last evening, they discovered that two trusties, Fred Smith and Charles Leonard, were missing.

Acting Master Edward O'Keefe sounded the alarm. Investigation showed that the men had walked boldly down to the boat landing, some distance from the main building, and after breaking a lock on a boat, rowed away over the waters of Shirley Gut. The boat they took is used to ferry the officers at the House of Correction across the Gut. The missing men are said to have rowed for the officers on a number of occasions.

The police of Boston and Winthrop were notified, so that the men would be captured if they attempted to land. The Boston harbor police took a trip down the bay in the hope they might find the escaped prisoners.

Smith is also known as Fred Pinkham and Leonard is also known as Charles Thompson. Both are said to be Boston men. Leonard was serving the last nine months of a five-year sentence. Smith was serving 18 months for larceny and peddling drugs.

TODAY'S GLOBE CONTENTS

Page 14.

Fitchburg woman, mother of 16, given 10 days sentence for shoplifting here.

Middlesex Sportsmen's bowlers improve hold on first in the Newton league.

Page 15.

Harvard football schedule for 1921 completed.

Baseball owners in New York on the scent for trades; McGraw trying to put through big deal with Reds.

Hoppe starts his exhibition billiards play here by twice beating Charles Peterson of St Louis.

American League official batting averages.

Bunker Hill A. A. five of Boston wins at Newburyport; other basket results.

Decision against sending Haverhill High eleven to Pasadena for another game.

J. Conway Toole succeeds David L. Fultz as head of National A. P. B. C., new name chosen by International League.

Pal Reed twice stops McClelland in one round in Carlyle A. C. bout.

Page 18.

League of Nations Assembly adopts international court plan, with a modification allowing members to refuse obligatory jurisdiction.

Harding and Root confer at Marion.

Fordney suggests refunding of Victory notes and Treasury certificates.

Ex-Ambassador Henry Morgenthau decided upon by President Wilson as his representative to mediate between Turks and Armenians, it is understood.

Union shoe workers at Lynn vote to authorize petitions to recall Mayor Creamer.

Wild geese demoralize signal system of Pascoag, R. I, branch railroad.

THE WEATHER

Forecast for Boston and Vicinity: Tuesday rain and warmer; Wednesday cloudy and cooler; increasing southeast to south winds reaching gale force, shifting to southwest.

Washington Forecast for New England: Rain and warmer Tuesday; Wednesday cloudy and colder; increasing southeast and south winds, probably reaching gale force and shifting to southwest.

Advisory southeast storm warning ordered 10 p m Eastport, Me, to New York, and southwest warnings from Sandy Hook to Charleston, S C. Storm of great intensity central over Wisconsin will move northeastward attended by increasing southeast and south winds, probably reaching gale force and shifting to southwest Thursday.

Globe's Forecast—Wednesday cloudy and colder; Thursday fair and moderate temperatures; diminishing southwest to west winds.

The Temperature Yesterday at Thompson's Spa: 3 a m, 36; 6 a m, 36; 9 a m, 39; 12 m, 43; 3 p m, 46; 6 p m, 46; 9 p m, 44; 12 mid, 42. Average temperature yesterday, 41 5-12.

Temperatures at 8 Last Night—San Francisco, 54; Williston, 34; St Paul, 32; St Louis, 46; Chicago, 54; Nantucket, 42; Portland, 32; Eastport, 32; New York, 48; Washington, 54.

To be sure of your copy of the Sunday Globe it is necessary that you order the paper regularly from your newsdealer or newsboy. Many dealers were all sold out last Sunday.

WILDEY SAVINGS BANK
52 BOYLSTON ST., BOSTON
Assets Over Twelve Millions
Money Deposited on or before
DEC. 15
Will draw interest from that date

THIS IS THE MONTH TO
Avoid Pneumonia
Dr. Hilton's No. 3
MEDICATED PELLETS

Real Estate Advts

In the Daily and Sunday Globe bring the best results. During the ten months ending November 30 the Globe printed **68,893 more Real Estate** advts than the second Boston paper.

Advertisers will please read and follow the directions printed below:

1—Until further notice advts under the following classifications must be in the office Friday to be sure of appearing in the following Sunday's Globe:

Machinery and Tools
Musical Instruments
Tours and Travel
Yachts, Boats, etc.
Furniture, etc.
Farm and Garden
Refrigerators, etc.
Poultry, Pigeons, etc.
Showcases, Desks, etc.
Typewriters, etc.
Safes, Cash Registers
Schools, Colleges, etc.
Dressmaking, Millinery, etc.

Want and Classified advts other than the above must be in the Globe office before 1:30 p. m. on Saturday.

2—Advts for the Daily Globe must be in the office before 9 o'clock of the day preceding publication.

"Without Mercy"

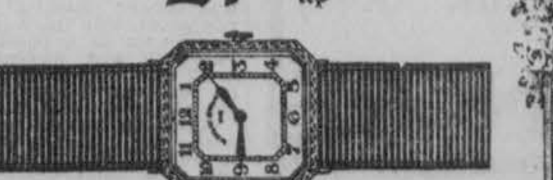
Begin this great story today. Order the Daily and Sunday Globe regularly from your newsdealer or newsboy.

FATHER JOHN'S MEDICINE
Builds new strength to fight off dangerous illness—of great value as a body builder. No drugs.—Advertisement.

Ask mother. She knows
JOHANN HOFF'S MALT EXTRACT
Gives Vim—Vigor—Vitality.—Advt.

ESTABLISHED MDCCCXXXI

Ribbon Wrist Watches
$27 and up



Please do not think that we are undersold by others who deal in our particular wares.
For we are not.

Please do not think because you happen to make a small purchase that it is not appreciated.
For it is.

Please do not think that everything in the store costs a million.
For it does not.

Please remember that everything we sell you carries our recommendation, our guarantee and our advice.

Bigelow Kennard Co., Inc.
511 Washington Street

Use it at the first *hint* of sore throat

Safeguard yourself against further and more serious trouble by taking Formamint, the germ-fighting throat tablet, at the very first sign of a sore throat. This common ailment, painful enough in itself, if unchecked, may easily develop into something more dangerous.

Sore throat is caused by germs—the kind you can't help inhaling, and that thrive in the soft tissues of the mouth and throat. Don't wait until you get home to use a gargle or spray, but have a few tablets of Formamint handy. Take one at once at the first sign, let it dissolve slowly in your mouth. Can be taken beneficially every half hour until throat is relieved.

Formamint mixes its powerful, pleasant tasting antiseptic with the saliva, bathing the infecting membranes continuously, combats the germs, keeping them at a safe minimum. Formamint is so convenient to take that it may be used unnoticeably anywhere you may be, on the street, in a crowded car, stuffy office, theatre, or school.

Buy a package of Formamint today of your druggist and be prepared to ward off sore throats, tonsillitis and influenza. Men find it very helpful in easing "smoker's sore throats."

Formamint is sold by all druggists. Any druggist will tell you how widely Formamint is recommended by throat specialists, physicians and dentists.

Formamint

GERM-FIGHTING THROAT TABLETS

Formamint is our trade mark. It identifies our product. Bauer Chem. Co., Inc., N.Y.

ANTI-WAR CONVICTIONS UPHELD BY SUPREME BENCH

Brandeis Dissents in Gilbert Case, Condemning Decision as Beyond the Court's Powers

WASHINGTON, Dec 13—The Supreme Court, in upholding today the war-time concivtion of Joseph Gilbert in Minnesota for violating State laws prohibiting interference with recruiting, declared that his statement, in the speech which led to his conviction, that the United States was forced into the war to "drag England's chestnuts out of the fire," was false and that he knew it was false.

Associate Justice Brandeis dissented from this "judicial finding" on the facts, which he said history would finally decide. He declared that it was wholly outside of the functions of the Supreme Court to attempt to pass on this question. He also argued that the Minnesota law was not a war measure, but was for "preventing the preaching in the State of the doctrine of preventing war."

Associate Justice McKenna delivered the opinion of the court, which overruled contentions of counsel for Gilbert that the State law was an encroachment on the war-making powers of the Federal Government.

The court sustained Federal court decrees quashing indictments against 25 defendants charged with participating in the deportation of 221 persons from Bisbee, Ariz, into New Mexico in July, 1917. Chief Justice White, who rendered the opinion, held in effect that the proceedings interfered with the State police powers and that, while the indictments sufficiently charged conspiracy to deport forcibly and against their will citizens of Arizona, the Federal statute did not apply.

Conviction in New York of David Lamar, "the Wolf of Wall Street," and Henry B. Martin on charges of conspiring to prevent the transportation of munitions of war to the Allies was sustained by the court, which dismissed the writ of error obtained by the defendants.

Conviction, in New York, of Morris Zucker on charges of having made an address "intended to encourage resistance to the United States" will stand, the court dismissing a writ of error. Sentence of 15 years' imprisonment was imposed on each of four counts.

The "Assigned Car" order of the Interstate Commerce Commission was upheld, the court refusing to review the appeal brought by the Lambert Run Coal Company.

The court announced a recess from Dec 20 to Jan 3.

POWDER EXPLOSIONS KILL 6, INJURE 8

DOVER, N J, Dec 13—Five men were killed and seven injured today in an explosion at the Atlas Powder Company's plant near Landing, on the west end of Lake Hopatcong. The explosion occurred in a building devoted to dynamite manufacture.

PITTSBURG, Kan, Dec 13—Explosion of 1000 kegs of powder at the Atlas Powder Company's plant near here today killed one workman and injured another.

EX-GOV McCALL TO SPEAK IN BOXFORD CHURCH

BOXFORD, Dec 13—Ex-Gov Samuel W. McCall, who was a school teacher in this town previous to his graduation from college, has accepted an invitation to speak in the First Congregational Church next Sunday morning on "The Significance of Forefathers' Day."

VELOUR HATS

For own wear or as Gifts

All silk lined
Pure silk bands
High lustre
Browns, Greens, Black
Austrian: $15 and $25
Stetson: $15, $16.50, $25
Others: $12

FUR CAPS
$10 to $35

MACULLAR PARKER COMPANY
400 WASHINGTON STREET
The Old House with the Young Spirit

DENMAN SCORES HURLEY'S POLICY

Ex-Head of Shipping Board Before Committee

Failure to Build Motor Ships "Climax of Blunders"

WASHINGTON, Dec 13—Operations of the Shipping Board during the early days of the war were handicapped by the insistence of the Allies, particularly Great Britain, that they be allowed to use available facilities in this country for constructing ships for them, William Denman, first chairman of the board, testified today before the House special committee investigating operations of the board.

Mr Denman told committee that most of this work was not of an emergency character and that the Shipping Board immediately proceeded to take over contracts which had been let by the Allies.

The board under Mr Hurley erred, he said, in failing to follow recommendations for the construction of a large fleet of Diesel motor ships and for the separation of the operation and construction activities of the board.

Mr Denman said he and Gen Goethals did not resign as a result of a controversy over wooden ships, as had been generally supposed. The real point at issue, he said, was the Hog Island shipyard.

"The public has treated Gen Goethals unfairly," Mr Denman declared. "His accomplishments were great."

Referring to the failure of the board to equip ships with Diesel oil engines, Mr Denman said that the wasteful steamships built for the war emergency were hopeless in competition with ships equipped with Diesel engines which were being constructed by the shipping interests in other countries.

Mr Denman told the committee that Charles M. Schwab contributed more than any other individual to the Government's shipbuilding program.

Reverting to the subject of motor ships, Mr Denman said the rejection by the board of this type of vessel was "the climax in the tragedy of blunders of the Hurley administration."

"Our wasteful steam engines are dependent on British bunkers," he said. "We cannot carry enough fuel to pay the loss up the smokestack and complete our long voyages. We must stop and beg fuel supply at the British and other bunkering stations on the China coast, in Japan, in the East Indies, at Suez, at Aden, in the Mediterranean and in the South Atlantic.

"How the British coerced our commerce by bunkering agreements before we entered the war is now history."

MINER MURDER CASES IN WEST VIRGINIA CONTINUED

WILLIAMSON, W Va, Dec 13—The case of Taylor Cole, accused of killing E. Lee Ripley, State policeman, Nov 19, was continued today until Wednesday. The cases of Taylor, Muncy and "Dutch" Frost, indicted for killing Ervine Elkins and wounding his brother, Joe, Nov 23, which were to have been heard Wednesday, were continued until Thursday.

Both cases grew out of violence preceding the arrival of the troops to restore order throughout the strike district.

William White was arrested today by sheriffs, charged with the malicious maiming of John Floras, an employe of the Matta Cooperative Coal Company, at Himler, Thursday.

TREAT DELINQUENTS ACCORDING TO BIBLE

Christian Science Trustees in New York Thus Explain Dismissal of 26

NEW YORK, Dec 13—Asst Dist Atty Rorke said today that no evidence of crime has been found in the examination of 16 witnesses in connection with charges made by Campbell McCulloch, formerly first reader of the First Church of Christ, Scientist, in New York, that certain papers stolen from his desk are being used to harm him.

In preferring the charges McCulloch said he resigned from the church to press a complaint of criminal libel against two of its trustees and 16 other members.

Mr Rorke said he had received important documentary data for use in the investigation, but declared that it would be several days before he could determine whether there was sufficient evidence upon which to base action.

Regarding the dismissal of 26 of its members who were reinstated last week when a court action they instituted was countenanced by church counsel, the board of trustees of the church today declared:

"It has been the aim of the board to keep the membership free from all false teachings and to maintain the true standard of Christian Science as set forth in the writings of Mary Baker Eddy.

"Those who have strayed from the tenets of our church and have adopted other teachings and practices inconsistent with true Christian Science are dealt with in accordance with the bylaws, which require that it shall be in the manner set forth in the 18th chapter of Matthew, 15th to 17th verses."

It has always been a custom, the statement added, to reinstate dismissed members when "proper and satisfactory representations" are made.

The directors of the Mother church, Boston, were not connected with the dismissals, the trustees explained.

VERSES REFERRED TO BY CHURCH TRUSTEES

MATTHEW XVIII, 15-17

15—Moreover if thy brother shall trespass against thee, go and tell him his fault between thee and him alone; if he shall hear thee, thou hast gained thy brother.

16—But if he will not hear thee, then take with thee one or two more, that in the mouth of two or three witnesses every word may be established.

17—And if he shall neglect to hear them tell it unto the church; but if he neglect to hear the church, let him be unto thee as a heathen man and a publican.

DORCHESTER MAN "CROWNS" BANDIT

Continued From the First Page.

"dug" for it. The holdup man "fell" for it.

As soon as the highwayman dropped his weapon by his side Haley "crowned" him by hitting him over the head so that his hat went down over his eyes. Then Haley fled with his money intact.

Haley told the police the man was about 23 years old, 5 feet 6 inches tall, weighing about 140 pounds. He was of dark complexion and wore a dark overcoat, brown soft hat and corduroy pants.

STOREKEEPER CHARGES TWO ARE HOLDUP MEN

John Hayes, 36, who claims residence at Keefe's Hotel, Dartmouth st, South End, and Clarence Seward, 19, giving his address as People's Palace, South End, were arrested yesterday and booked at Station 9 on a charge of robbery, while armed, of $15 in money and a watch, the property of Hyman J. Shaffer, who conducts a second-hand clothing store at 1980 Washington st, Roxbury.

It is alleged that on Nov 30 the men went into Shaffer's store and one of them ordered a pair of shoes. While Shaffer was fitting on the shoes he was struck over the head with the butt of a revolver and was robbed while in a dazed condition caused by the blow.

Yesterday afternoon while Shaffer was walking along Canal st, near the North Station, he saw Hayes and Seward looking in a store window. He recognized them as the two men who held him up and got a traffic officer and had them arrested. They were taken to the Hanover-st Station and later were turned over to Sergt Dickinson of the Dudley-st Station. Both men deny Shaffer's allegation that they are the men that held him up and robbed him.

The police say they found a 22-caliber revolver, fully loaded, on Hayes.

ROXBURY WOMAN VICTIM OF HANDBAG SNATCHER

Mrs Emma L. Adams of 4 Dearborn pl, Roxbury, was a victim of a handbag snatcher last evening at about 7 o'clock. Mrs Adams was walking through Zeigler st, near Dearborn st, Roxbury, when a young man ran up behind her and tore her handbag, containing $10 in bills and $2 in change, out of her hand.

She did not give a very thorough description of the robber at the Dudley-st Station, where she reported the theft, merely stating that he was from 28 to 30 years old and that he wore a dark suit.

HOUSEBREAKERS GET $480 LOOT IN CHELSEA HOME

The home of David Caro, 159 Shurtleff st, Chelsea, was broken into and robbed yesterday afternoon some time between 12:30 and 5, and $298 and jewelry worth $182 stolen. The furniture was broken and jimmied apart. The front door was forced by a jimmy.

The loot included gold rings, brooches, stickpins and lockets. A gold World War medal, presented to the family by the Masonic Lodge of Monson in honor of Capt Helman Caro, who died in France, was stolen. Capt Caro was the son of David Caro.

FLAT WORKERS ROB TWO FOREST HILLS APARTMENTS

Flat workers visited the apartment house at 7 Arborway ct, Forest Hills, yesterday afternoon, and were successful in gaining entrance to two apartments. Double locks on the doors of the other apartments prevented them from gaining entrance with jimmies.

William H. Morgan, who has an apartment on the second floor, reported that when he reached home last evening he found his door had been jimmied and a woman's gold watch, valued at $50; two gold rings, $200, and an Alaskan sealskin coat, $1000, all the property of his wife, and a pair of gold cuff links, belonging to Mr Morgan, valued at $25, were missing. The thieves overlooked many other valuable articles. They carried off the stolen articles in Mr Morgan's grip.

Two men, one carrying the leather grip, were seen leaving the house by a young woman who resides in the building. The coat was sticking out of the grip at the time. The young woman got a good look at their faces, and she will probably go to Police Headquarters today and look at the pictures in the Rogues' Gallery.

Miss Mary Sullivan reports that her apartment on the third floor was entered by jimmying the door, and silver and articles of jewelry valued at $100 were stolen.

Mrs Helen Osterhout, who has an apartment on the third floor, found her door jimmied, but the strong bolts on it prevented the thieves from entering. The same was the case at the apartment of the Misses Eleanor and Mary Klemm, on the first floor, where strong bolts prevented entrance after the door had been jimmied.

FALSE KEY WORKERS ROB WEST SOMERVILLE FLATS

A pair of false key men paid a visit to West Somerville yesterday and in two breaks carried away goods valued at about $385.

The first robbery was at about 4 o'clock, when the men entered the first floor apartment at 19 Park av. Mrs Morris Zwicker, the occupant, was out at the time and the thieves took her diamond ring valued at $150, a child's opal ring, valued at $10, and a child's wrist watch, valued at $25.

The same pair apparently, five minutes later visited the home of Henry H. Pierce, 929 Broadway. Mrs Pierce was out and the thieves are believed to have gotten in to the apartment on the first floor by means of false keys. They carried off a ladies' wrist watch, valued at $25; a ladies' open front watch, valued at $25; a diamond stickpin, valued at $50; five gold stickpins, valued at $25; two pearl necklaces, valued at $35; a ladies' sapphire ring, valued at $15, and a 14-inch mahogany "night stick," which Mrs Pierce was keeping as a souvenir.

Mrs Pierce is a daughter of the late Inspector Thomas Norton of the Bureau of Criminal Investigation, Boston Police Headquarters, who was shot several years ago by a much-wanted man he had cornered in a cafe at Washington and Boylston sts, Boston. The club was carried by her father when he did duty as a patrolman.

Neighbors on Park av told the police that they saw two men trying front doors in the late afternoon. They described each as about 6 feet tall, one of them wearing tortoise shell glasses.

OLD SOUTH CHAPTER, D. A. R., OBSERVES ANNIVERSARY

Old South Chapter, D. A. R., celebrated its 24th anniversary yesterday in Chipman Hall, Tremont Temple, Miss Josephine G. Richardson, regent, presiding. The guests of honor were Mrs James T. Morris of Minneapolis and Mrs Frank Dexter Ellison of Belmont, both officers of the National society.

Mrs Morris referred to the petition to Congress for the purchase and presentation as a National Park the Moorehouse farm and fortifications at Yorktown, Va. Mrs Ellison, who is librarian of the National society, spoke of the library at Washington, and paid tribute to the founder and first regent, the late Mrs Laura Wentworth Fowler.

Mrs Arthur T. Power spoke of the tercentenary memorial of the D. A. R., and Mrs George Maynard Miner described a fountain to Pilgrim Mothers proposed for the park opposite the landing in Plymouth. The cost of this memorial will be $25,000.

Other speakers were Mrs Franklin P. Shumway, Mrs James Peabody, Mrs Rufus K. Noyes and Miss Ida Hinman of Washington. There was music by Miss Gilbert of the English Grand Opera Company, Paul M. Thayer, tenor soloist, and Mrs Fred Bowman, pianist. Mrs Lucinda Viles was in charge of the tea.

CHAS. B. TABER, WHITMAN, TO BE BURIED TOMORROW

MEDFORD, Dec 13—Funeral services for Charles B. Taber of Whitman, who died at the Brockton Hospital last Saturday, will be held at 2 o'clock Wednesday afternoon at 36 High st. Burial will be in Oak Grove Cemetery, in this city.

Mr Taber, who was a retired carpenter and builder, lived at 11½ South st, Whitman. He was born in Vassalboro, Me, Dec 26, 1841, of Quaker parentage, the son of Jacob and Sarah (Rackliff) Taber.

Although not of age at the outbreak of the Civil War, he enlisted in the 1st Maine Cavalry at Portland, Me. During the last year of the war he entered the Navy, serving on the U. S. S. Tioga.

Mr Taber was a descendant of Philip Taber, who was one of the earliest settlers of this country, and of William Taber, who, in 1639, was a Representative at the 1st General Court at Plymouth. He was a member of Fletcher Webster Post 13, G. A. R., Brockton.

Mr Taber was married in 1869 to Miss Sarah Matilda Carter of Stockton Springs, Me, who survives him. Mr and Mrs Taber celebrated their golden wedding on Dec 16, 1919. Besides his wife, Mr Taber leaves three sons, Charles J. Taber of Bainbridge, N Y, Athol I. Taber of Pittsburg and Melburn E. Taber of this city.

REFUSES WARRANTS IN HOLBROOK JITNEY CASE

QUINCY, Dec 13—An application by Town Counsel C. C. Mellen of Braintree that Roy E. Fisher, Wilfred B. Borden and Walter C. Weisford of Holbrook be summoned to court on charges of violating the motor vehicle laws of Braintree was refused today by Judge Avery of the District Court. The three defendants were fined $50 each last week. They appealed and Judge Avery suspended issuing the warrant asked for today until the Superior Court disposes of the cases.

The men belong to the Holbrook Improvement Association, which maintains a jitney bus service between Holbrook and South Braintree for carrying of men and women between their homes in Holbrook and their work in South Braintree. The members pay $1.20 a week dues, which represents costs of transportation and the pay of $40 per week for two operators of the buses. The contention of the Holbrook people is that they do not maintain jitney buses for hire or reward.

Braintree Selectmen, having refused all jitney licenses in that town, want these jitneys stopped, because they claim they are operating in Braintree without a license, which the Selectmen will not grant. The Holbrook people contend they do not have to get a jitney license, because they are not in any commercial line of endeavor and are not competitors of the street railway company, which is protected against jitney competition by the Public Control act.

GEMS STOLEN FROM CATHOLIC CHURCH

NEW YORK, Dec 13—Pearls and diamonds, said to be worth from $10,000 to $100,000, were stolen from a golden vessel in the Catholic Church of St Vincent Ferrer within the last day or two by thieves who escaped without leaving a trace as to their identity or the exact time of the robbery.

A lay brother, entering the church today, discovered the disorder wrought by the robbers.

HOUSE PASSES WAR LAW REPEAL

One-Year Immigration Ban Is Also Adopted

War Finance Corporation Resolve Through Senate

Survey of Departments Next Business Before House

WASHINGTON, Dec 13—Repeal of nearly all the wartime laws and a one-year ban on practically all immigration were voted today by the lower house of Congress, while the Senate passed the resolution reviving the War Finance Corporation. Each measure now goes to the other house.

Tomorrow the House Committee on Rules will bring in a special rule to limit debate on the resolution offered by Representative Reavis, which would provide for a Congressional survey of the Government's administrative departments. Action on the floor will follow a vote on the adoption of the rule.

Unanimous for War Law Repeal

The Volstead resolution repealing war laws was adopted unanimously by the House, 323 votes being cast.

The resolution, which now goes to the Senate, exempts from repeal only the trading with the enemy act, the war finance corporation act and its amendments, and measures dealing with the issuance of Liberty and Victory bonds.

Before the final vote the House accepted an amendment providing for inclusion of the Lever Food Control act among the laws which the resolution would repeal. The amendment, which covers all provisions of the act with the exception of the section relating to rents in the District of Columbia, was offered by Representative Bland, Republican, Indiana. It was carried by a vote of 179 to 137.

The resolution declares "any act of Congress that by its terms is in force only during the existence of a state of war and a limited time thereafter shall be construed and administered as if the present war terminated on the date when this resolution becomes effective."

The measure, as adopted, is practically identical with that passed by Congress just before adjournment of the last session, which was vetoed by President Wilson.

Republican leaders asserted tonight that adoption of the resolution was one of the first steps taken by the Republican majority to fulfill the campaign pledge to put the country on a peace time basis.

Johnson Bill Vote 293 to 41

The vote on the Johnson Immigration bill in the House was 293 to 41. It brought to an end more than three days of heated debate on immigration affairs. It also followed futile attempts by the bill's supporters to lengthen the prohibition period to two years as originally proposed. The first of these attempts brought a rising vote in favor of the two-year exclusion, but a second call showed 181 in favor of the one-year period and only 165 opposed.

The bill was transmitted to the Senate, where it will be referred to the Immigration Committee and action will be deferred until the committee has concluded hearings and investigated thoroughly all phases of immigration and naturalization questions. A number of measures bearing on these subjects are pending in the Senate and it is regarded as likely that they will be incorporated in the Johnson bill when it is finally reported to the Senate for consideration.

The attitude of Senate leaders today was that no hasty action should be taken by that body in dealing with immigration issues.

Urge Extension of Credits

The Senate adopted the Agriculture Committee's resolution directing the revival of the War Finance Corporation as a measure of relief for farmers, without a record vote.

The second section of the resolution, which as introduced would have directed the extension of liberal credits to farmers by the Federal Reserve System, was amended to make the desirability of such a course only an expression of opinion of Congress. The amendment was proposed by Senator Norris, Republican, Nebraska, and was accepted by a vote of 47 to 16.

Another change in the resolution, made on suggestion of Senator Smith, Democrat, Georgia, broadened the duties of the Finance Corporation to include the financing of exportation of products other than those produced on the farm.

Amendments submitted by Senator Harris, Democrat, Georgia, to make the rate of discount on loans to farmers 5 percent, and by Senator McKellar, Democrat, Tennessee, to make cotton factors' paper eligible for discount, were rejected by overwhelming votes. A substitute for the resolution presented by Senator Spencer, Republican, Missouri, met a similar fate.

Text of Principal Sections

The section of the resolution directing revival of the War Finance Corporation, as adopted, reads:

"The Secretary of the Treasury and the members of the War Finance Corporation are hereby directed to revive the activities of the War Finance Corporation, and that said corporation be at once rehabilitated with the view of assisting in the financing of the exportation of agricultural and other products to foreign markets."

The resolution as adopted refers to the extension of credits as follows:

"It is the opinion of Congress that the Federal Reserve Board should take such action as may be necessary to permit the member banks of the Federal Reserve system to grant liberal extensions of credit to the farmers of the country upon the security of the agricultural products now held by them, by permitting the rediscounting of such notes of extension at a fair and reasonable rate of interest."

The measure now goes to the House, where a number of similar farmer relief measures are pending. An addition to these was made today when Representative Young of North Dakota offered a bill proposing an embargo on imports of grain and grain products, livestock and their products for one year.

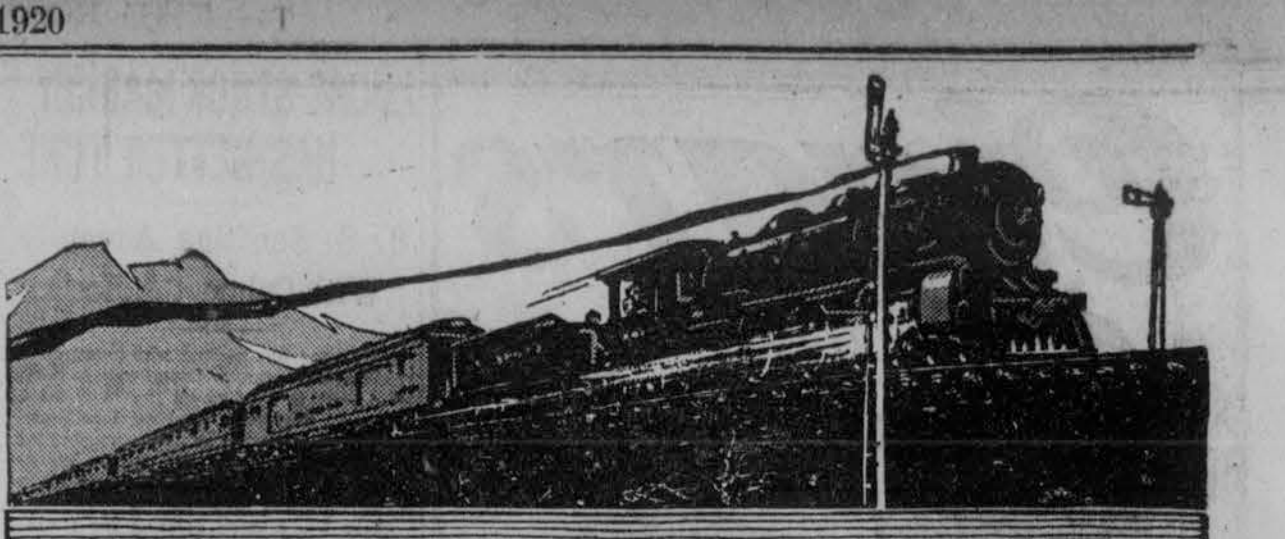
The Senate Agriculture Committee continued its hearings with a view to framing other measures looking to the relief of the farmers from the conditions brought about by falling prices.

INAUGURAL COMMITTEE APPOINTED BY GILLETT

WASHINGTON, Dec 13—Under authorization of a resolution adopted today by the House, Speaker Gillett appointed three members to a Congressional committee which will arrange for the inauguration of President-Elect Harding. Those appointed are Representatives Cannon, Republican, Illinois; Reavis, Republican, Nebraska, and Rucker, Democrat, Missouri, and they immediately will begin conferences with the three already selected by the Senate.

AMERICAN HEIRESS DIVIDES $50,000 ENGAGEMENT GIFT

LONDON, Dec 13—Miss Eleanor May Guggenheim, daughter of Solomon R. Guggenheim, who is to be married on Thursday in St Margaret's, Westminster, to Viscount Stewart, son and heir of the sixth Earl of Castle Stewart, has divided the $50,000 engagement present given her by the Viscount among various American charities, the King Edward Hospital Fund in London and the Tyrone County Hospital.



PACIFIC LIMITED
Chicago
Milwaukee & St. Paul
Railway

Pre-War California Service

The *Pacific Limited* between Chicago and San Francisco is now in service via the Chicago, Milwaukee & St. Paul Railway.

The new schedule saves time on your transcontinental trip.

Leave Chicago (Union Station) 10:45 a.m.
Arrive San Francisco 8:30 (third morning)

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READY TO HAVE WIFE GO HOME

Continued From the First Page.

scientist and research worker told the court that in March, after a visit to his attorney by Mrs Kinraide, who was threatening divorce, he told her the story of his meeting her mother and all that followed up to the time he married.

Kinraide told how his wife and mother-in-law left the house July 21. He said that he was in his shop at the Hermitage in Sandwich, fixing a boat for his son, when he heard loud voices. The respondent said that he went in the house and found Mrs Kinraide, Mrs Ford and his sister, Mrs Carpenter, in a "terrible row."

Tells of Row at Sandwich

Going in he said he heard Mrs Ford declare in a loud and angry voice "Yes, and I have been his mistress." Witness said he was so shocked and surprised that he was unable at first to realize what was going on. He heard his sister say "You told me you met him in a theosophical meeting."

Kinraide said that he entered into the row then and said to his sister, "I met her in a house in Philadelphia."

At that point the witness declared his wife rushed in front of him and shaking her fist shrieked at him, "Why didn't you marry my mother?" Kinraide said he told his wife the reason he never married her mother was that "she had a terrible temper, and I absolutely could not do so."

According to the respondent, Mrs Ford then declared that the relationship continued all during the married life and Kinraide told the court that he told Mrs Ford: "It is an absolute lie and you must pack your things and leave the house immediately." "With a malicious grin," Kinraide said, "Mrs Ford jeered at me, saying, 'Now you have lost your wife, what are you going to do about it?' she then said, 'Let's go.'"

Witness said he announced that Mrs Kinraide was not included in the orders to leave the place and that in fact he did not want her to go and told her so. Mrs Ford, however, said the witness, ignored him and told his wife to go and put her clothes on right away and start for Boston, where the court was in session, and that Mrs Kinraide could get a divorce.

Mrs Kinraide, according to the witness, was reluctant to do so. He said he visited Mr Adams at the Daniel Webster Inn, where the latter told him that he had been engaged by Mrs Kinraide and had already begun proceedings by placing an injunction on his property and an attachment on his bank accounts.

Thought Action Ill-Advised

Witness said he told his wife he thought that court action was ill advised, that no good would come of it and that it was not necessary to go to such extremes. "I told her" said Kinraide "that it was a treacherous thing to do, to come back home and deceive us."

According to Kinraide his wife told him she was glad that she had fooled him and that she had played her part to perfection. "Since then," said Kinraide, "she has been away."

If given control of the children, he said he would devote all his means to their education.

At that point he was asked if he would take his wife home. He left the witness stand and resumed his seat back of his counsel. His head was bent down and his wife half turning in her chair, stared long and hard at him. Her face appeared strained and troubled.

Kinraide earlier in his testimony admitted he allowed himself to be put to bed, but at the same time he said that he received a beating from his wife and Mrs Ford. He said that the night after the incident in March, when he told his wife about his relations with her mother, he tried to get his wife to talk to him or let him into the room, where she was with Mrs Ford. She would not answer him, and he said he went to the shop to do some drinking. He said he might have taken one high ball and then returned. He said he induced the women to go upstairs. He said they were under the impression that he was drunk, and on account of the strained situation he said that he thought he would let them retain the impression.

They put him to bed, when, he said, he remembered that he had left some valuable papers in his unlocked desk and attempted to get out of bed and go down to get the papers.

Says Women Pounded Him

He said that the women held him in bed by the ankles and that when he persisted in his efforts to get up, they pounded him. He said he finally got away, but that in the mix up his clothing was torn. Before he could get down stairs his wife threatened to call the police unless he got back into bed and he said he went to bed.

He was charged with being under the influence of liquor at the time of the Joffre parade in Boston and last July 4 at Sandwich. He denied the allegation and said that he had obtained a window at the Thorndike for his family to see the parade and that he drove them there and back. July 4 he said he drove the family to the fireworks and back.

Kinraide was questioned regarding the health of his wife a few years ago and he said that she appeared to be healthy and weighed 225 pounds. Later she took a course for reducing and is now considerably lighter.

His wife was extremely indifferent to him, said Kinraide, and did not care for his company or his companionship during their married life. He said that she never sought his company and that during the entire 15 years of his married life he never had an opportunity to sit down for a whole evening and chat alone with his wife. His mother-in-law was always around and he said that she constantly interfered in any arguments he had with his wife.

Kinraide told the court that he was devoted to his children, and many times when they were teething he sat up half the night with them. The children would cry in pain or from bad dreams and his wife never responded. Kinraide said that at times he waited an hour to see if she would awaken and go to the children, but that she did not and he visited them.

About 50-50 on Not Speaking

Regarding the charge that at times he did not speak with his wife, he said it was about "50-50," for there were many times when she did not speak to him. He said that once he ordered a nephew of his out of the house because Mrs Kinraide became too hilarious over what the nephew was saying and doing. Kinraide said he always had liquor in the house and that Mrs Ford always ordered it.

Many character witnesses testified during the day. They said they never saw Kinraide under the influence of liquor. For the most part that was the extent of opinion asked of them.

Mrs Jennie R. Kingsbury, a character witness, injected a little novelty into her testimony by declaring that she would not listen to words said by Kinraide and his wife who were squabbling. She said she was sleeping near the Kinraide room at Sandwich, Aug 5. She said she was within hearing distance "if she listened."

"Did you take any precautions not to hear?" asked Mr Morse. Witness said she did, adding, "I buried my head in the pillow, for I was a friend of both." She would not deny that she begged Mrs Kinraide the next day to leave the house for her safety.

William Davidson, an electrician, who lived at the Jamaica Plain house, said that he is a nephew of Kinraide and that he came to Massachusetts in 1894 with Kinraide and Mrs Ford from his home in Moncton, N B. He said he had keys to both the Summer and Winter places and lived there much of the time, and for most of the time had been in Mr Kinraide's employ.

He said that many times he was called to the house by the women, but often did not go; or, if he went, found Kinraide ill in bed.

Says Kinraide Struck Him

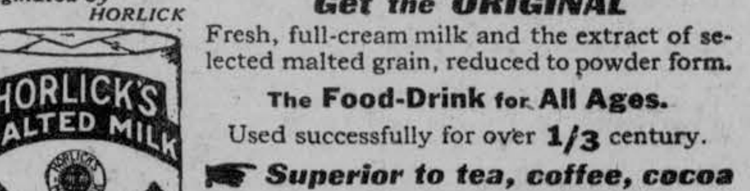
He said at the time that Kinraide ordered one of his nephews out of the house he interfered and Kinraide struck him, the only time in all their association. He admitted that on several occasions he had helped the women put Kinraide to bed and said that once he, alone, put Kinraide to bed.

Among those who testified to Kinraide's sobriety were Alberta M. Ripley of Moncton, N B, who in 1902 was brought to Boston by Mrs Ford and Kinraide; Mrs William Davidson of Jamaica Plain, Mrs Bessie Fraser of Somerville, Miss Olivia Davidson of Somerville, Frederick K. M. Durkee of Brookline, Gustave E. Wicksell of Roslindale, John Edward Callahan of Jamaica Plain, Delia King of Jamaica Plain, at one time a maid in the Kinraide home; Katherine Tracy of Roxbury, who also was a maid; Anita Stanley of Newark, N J; Rev Harold L. Pickett of Woburn and John A. Holway, register of deeds of Barnstable.

Court adjourned to tomorrow morning at 9:30, but it is understood that the Kinraide case will not go on until Wednesday, when all evidence should be in by noon and arguments completed by late afternoon.

Addresses Pianoforte Teachers

The Pianoforte Teachers' Association was addressed last evening at 82 Chestnut st, West End, by Newton Swift of New York, who also gave pianoforte demonstrations. Miss Eleanor Brigham presided.



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KINRAIDE TELLS HIS LIFE STORY

BY ROY ATKINSON

Post Staff Correspondent

BARNSTABLE, Dec. 11.—While scores of women spectators leaned forward in the Probate Court to catch every word he uttered, Thomas B. Kinraide, scientist and X-ray expert, laid bare his life today, going into the most intimate details, both before and during his married life, saying that he had wedded the woman who is now bringing action against him for separate maintenance because he wished to make amends to her in this manner for burning her while conducting an experiment with his electrical apparatus.

TESTIMONY SENSATIONAL

This has been a day of testimony of the most sensational nature, as Kinraide, whose admitted income is not far from $25,000 yearly, described his first meeting with his mother-in-law, Mrs. Rachel S. Ford, in a Philadelphia house in which he found her surrounded by young women whose morality he questioned, and the receipt of a telegram the next night while he was with her at a hotel, that contained the news that her husband had committed suicide.

It was a story that commenced at the time Kinraide, a young man of 25, wandered into the Philadelphia house, where he met Mrs. Ford and asked her if she thought that it was a nice place for a girl to stay. Then it was, Kinraide said, that Mrs. Ford asked him if he was "attending a funeral." He added that the woman proprietor of the house had told him that he could take out one of the girls, whereupon he had announced that he would take the young woman who asked him if it was a funeral he was attending.

Came to Boston

Then, for hours, the story ran on. Mrs. Ford's first appearance in Boston came at the time she left Philadelphia and took up her residence in the South End of Boston on Tremont street.

Kinraide's testimony had been preceded by that given by many witnesses from Sandwich, where his summer home is located. Among these men were several who are prominent in the business life of that little hamlet. To a man they said that they had never seen Kinraide under the influence of liquor, although one witness testified that he had returned from Boston on one occasion in a "very talkative" condition.

This was the sum and substance of these "character" witnesses, who were brought to the front by the defence for the sole purpose of refuting the statements made by Mrs. Kinraide, Mrs. Ford and others, that Kinraide drank to excess and was frequently in a drunken condition.

Seated among the spectators, not far from the witness stand, was Mrs. Ford, while Mrs. Kinraide was by the side of her counsel, William C. Adams, of Boston.

Kinraide was dressed in a well-fitting brown suit and wore a blue tie. Although a large part of his income is said to come from stock of what is perhaps the largest jewelry firm in the United States, the only sign of gold noticeable was from a chain of the metal across his waistcoat front.

Kinraide Tells Story

It seemed apparent that he was telling his story with extreme reluctance. Now and then his voice would drop so low as to be barely audible. Two or three times he gave his testimony before Judge Raymond A. Hopkins and attorneys grouped about the bench, it being deemed of such a nature that it should not be made public.

It was shortly after noon today that Kinraide was called to the witness stand. His appearance there had been long anticipated and there was a distinct stir in the courtroom as he took his place by the side of the judge's bench.

Quietly he testified that he is 56 years old, that his winter home is in Jamaica Plain and his summer residence in Sandwich at "The Hermitage." Kinraide gave his occupation as scientific research, in which he said that he has been interested from boyhood. It was in 1892-93 that he took it up as a life work. His most notable achievement, he said, was the development of a system for recording inaudible sounds, running up to 400,000 vibrations a second. He was also the inventor of the "French Gap" for the wireless apparatus.

His Jamaica Plain house, Kinraide said, was built by him with the idea in mind of using it for a place for scientific research. He described it in detail, saying that it contained a machine shop, a fully equipped laboratory, rooms for several men, a dark room for photographic purposes and furnaces in the cellar for fusing alloys.

Meeting Mrs. Ford

It was then that Attorney William A. Morse asked Kinraide about his first meeting with Mrs. Ford, his present mother-in-law. He described this event in the Philadelphia house in detail and added that he had registered with the woman the next night at a hotel as "R. S. Ford and wife."

It was that night that Mrs. Ford's sister came to her with a telegram which stated that her husband had committed suicide. Kinraide declared that he did not know up to that time that Mrs. Ford was married. He said that he would not have been in the hotel with her if he had known the true facts.

The next summer Mrs. Ford came to Boston, and finally took a house in the spring of 1893, at 550 Columbus avenue. He called on her there from time to time. In 1897 she came to his home in Jamaica Plain to live.

It was through an altercation which he had with her, Kinraide stated, that he learned of an illegal operation which Mrs. Ford had undergone. He had chided her for not "acting properly," and she had flown into a rage.

Then Kinraide described the burns he inflicted on Mrs. Ford's daughter, the girl who was later to become his wife. It was while he was experimenting with his X-ray machine, and she acted as a subject. He believed it was in 1899.

Kinraide said the burns caused by the X-ray were very serious, but he added that he did not know at the time that they were so dangerous.

"I told Mrs. Ford," he said, "that I had burned Ethel and that in one or two similar cases death had resulted."

Kinraide then said that suit for damages might be brought against him. He also offered to settle his fortune on her and finally suggested marriage. Mrs. Ford stated that she had no objection to this and so this event took place.

Loved Wife Very Much

Attorney Morse referred to letters which Kinraide had written his wife, which have been read in court, and asked him if they were his true sentiments.

"They hardly expressed them," he replied.

"Did you love your wife?" persisted Attorney Morse.

"Very much," quietly replied the witness.

"In all the letters you wrote you expressed a desire for the companionship of your wife?"

"Yes," he replied.

Then Kinraide explained how his household was financed. He stated that he usually looked over the bills and signed checks for their payment. Sometimes checks were signed in blank.

Kettles and Stills

In the testimony that had been given reference has been made to a copper kettle. Kinraide explained that this utensil was purchased about 20 years ago in connection with other equipment.

Kinraide said that in all from 15 to 20 stills used for different purposes and of all sizes were in his possession at one time. They were largely used for the extraction of alcohol from essential oils, a sort of reclamation process.

The witness denied that he had ever used any of this reclaimed alcohol for beverage purposes and added that he generally kept a case of liquor in the house. At the time he entertained the Williams Club, of which he is, and has been for 12 years, president, he provided alcoholic refreshments.

Referring to his children he said that his first daughter, Cecil L., was born in 1906.

"Are you very fond of her?"

"I am," replied Kinraide.

July 26, 1908, Robert was born.

Kinraide said that his relations with his wife had been pleasant up to 1910 with the exception that he did not have her company often.

"You did not see so much of your wife as you desired?" asked Attorney Morse.

"No," replied the witness.

Then Kinraide in a very low tone of voice described an incident of his home life with much apparent reluctance. Regarding a visit of a doctor he said he threatened that if his wife and Mrs. Ford did not tell him what had happened he would take the matter up with the district attorney and make them tell him. He was then told that an abortion had been performed on Mrs. Kinraide.

Asked by Attorney Morse to state his feelings in regard to Mrs. Ford from that time on, he said: "I absolutely distrusted and feared her and hated her after that time."

Mrs. Kinraide's Companion

Kinraide then referred to testimony which had been given by Miss Jessie H. McDonald, a trained nurse and companion of Mrs. Kinraide. He said that he had met her in the rooms occupied by a Back Bay physician in 1908. He had gone there at the request of this man's son to try and get him to reform in regard to the excessive use of liquor.

He said he asked Miss McDonald if she was doing right by being in such close quarters with the doctor. He denied having ever made any improper advances to Miss McDonald.

Kinraide then described an occasion in his own home in which Miss McDonald became enraged at something Mrs. Ford had said, at which time she threatened to have this woman prosecuted for libel and slander.

"I begged her to forget it," said the witness, "and gave her some money. I don't remember whether it was $100 or $150."

Tears nearly came to the eyes of the witness when he referred to his children. He said he had absolutely no power over them, and that if he attempted to rebuke them for some childish fault it would provoke a "storm."

"If I spoke to one of the children crossly I was looked upon as a brute," he said.

"That about the 'brute' may be scratched out," said Judge Hopkins.

Kinraide deplored the fact that his children were not allowed to play with other children, and that, although he had fixed up a large place for them to coast and skate on, they were not allowed to use it.

On one occasion he went upstairs and found his eldest son reading a book. He asked him why he was not out skating, and Mrs. Kinraide interrupted with a remark that it was by her orders he was not doing so.

It was then that his wife, he said, rushed at him and thrust her face toward his. He said that he was obliged to hold up a magazine to protect himself.

Then Kinraide described another incident, in which he had thrown water at his wife because she had called him a "coward," "sneak" and other names. She had refused to stop using this language, which he gave as his reason for throwing the water.

"Was there ever any time during your life that you ever laid hands on your wife or struck her," he was asked.

"No, sir," replied the witness.

Then Kinraide described an automobile trip he took when he said that he was so ill he did not feel able to attempt the journey, but did so, when importuned by the women members of his family. He denied that he was under the influence of liquor on this occasion, although he had taken a highball before starting on the trip.

On Dec. 27 he returned late one night and asked his wife if she would get him something to eat. Kinraide said that he found her in the nursery at the time, and as she did not answer him at once he remarked that she might give him more attention if he gave her a new automobile. At that, he said, she threw a calendar at him and remarked that he should not use such language.

Kinraide said that he had never denied the paternity of his son Tom, as Mrs. Kinraide claims, and then stated that he had responded to a toast at the Massachusetts Yacht Club, Atlantic avenue, Boston, in honor of the birth of his son and heir.

"Marrow Bone" Episode

The now famous "marrow bone" incident was described by the witness in detail. It was claimed by his wife that he came home drunk and cooked the bones. This Kinraide denied today, saying that he was very fond of the marrow of large beef bones and that his children liked it too. They were in the habit of cooking the bones 20 minutes and spreading the warm marrow on bread, like butter.

Kinraide explained that tobacco makes him deathly ill, which is the result of exposure that he underwent at the time of the opening of the Yale Bowl. Since that time he has been unable to remain in the company of smokers any length of time without being made sick.

Kinraide was still on the stand when court adjourned until Monday morning.

Said Kinraide Was Jealous

Miss Jessie H. McDonald was the last witness of the morning for the plaintiff. She said that it was a common occurrence for Kinraide to follow his wife, and he often said to her that he was sure there was another man she was interested in.

Miss McDonald testified that she told Kinraide that he had an "ideal wife."

At table, according to Miss McDonald's testimony, Kinraide would "glare" at his wife for from five to 25 minutes at a time, with his fists "clenched." She said that as a result, Mrs. Kinraide was kept at a very nervous tension. This testimony Judge Hopkins ordered stricken out of the record.

Under cross-examination of Attorney Morse, Miss McDonald said she did not recall Kinraide ever saying that she was compromising herself by being in the rooms of a Beacon street physician. She also denied that she had left the Kinraide house in a fit of anger because Mrs. Ford had said that she was intimate with the Beacon street doctor.

Kinraide, according to Miss McDonald, had asked his wife to go out for an automobile ride shortly after the birth of a child, but that she (Miss McDonald) had forbidden her to do so.

Rachael Stanley Carpenter, who said that she is a teacher, testified that she is a niece of Kanraide, and that she had never seen him under the influence of liquor. She also said that he was kind to his wife and children.

Among those from Sandwich who testified as to the sobriety of Kinraide were George T. McLaughlin, postmaster; J. Frank Giles, Dr. Edward S. Talbot, George A. Gibbs, George E. Stephens, George L. McCann, Jerome Holway, James H. Kelliher, Fletcher Clark and others.

YD MEN WILL TENDER RECEPTION TO EDWARDS

Former YD men from all parts of New England will gather Wednesday night at the YD Club House, 200 Huntington avenue, to greet Brigadier-General Clarence R. Edwards, former commander of the 26th Division, to receive him in the new YD home, which he was instrumental in establishing for New England's veterans of the 26th Division.

Elaborate plans have been completed to greet the "Grand Old Man" in the new clubhouse, which is one of the finest in the State. The committee has also invited Mrs. Edwards, who greatly assisted various auxiliaries of the division in the fitting of many rooms of the clubhouse.

SCRUBWOMEN GET AN INCREASE OF PAY

Scrubwomen employed in office buildings throughout the State were awarded an increase in wages yesterday of approximately 25 per cent by the Minimum Wage Board on office and building cleaners. The new wage called for by the award will be 37 cents an hour, and is based on a week of 42 hours. Most of the women employed in this occupation, says the report of the board, work approximately 33 hours a week.

FIRE DESTROYS OSGOOD ESTATE

Noted New Hampshire Residence Burned to Ground---Owned by Cohasset Man

NEW HAMPTON, N. H., Dec. 11.—Fire which started tonight from an unknown cause in the garage on the estate of Major George Osgood of Cohasset, Mass., totally destroyed the garage and the handsome residence valued at upwards of $50,000 at the top of Gross Hill, two miles up from the village.

SPECTACULAR BLAZE

The fire was very spectacular and could be seen for a distance of 25 to 30 miles. The presence of 50 to 75 pounds of dynamite on the premises occasioned much apprehension, but it was removed to a place of safety before the shed in which it was stored caught fire.

The strong northwest wind drove the flames upon the woodsheds, bullpen and the residence, but at a late hour tonight it was believed that the volunteer fire-fighters who flocked from the village would be able to save the barn, said to be one of the largest in New Hampshire. The servants' house was also saved.

It was reported that all the valuable stock of the place was saved, including a heard of 16 pedigreed cattle, 40 pigs, 30 sheep and five blooded horses.

Costly Furnishings Destroyed

The residence, one of New Hampshire's show places, overlooking the Presidential Range, was burned to the ground. But little of its costly furniture was saved. It contained solid mahogany furniture and works of art of great value.

At the time the fire started Major Osgood was at the home of his sister, Mrs. George S. Hollister of 86 Addington road, Brookline. He was notified by telephone and started for here immediately. On the place when the fire broke out was Major Osgood's mother, Mrs. F. H. Osgood, his brother, Champion B. Osgood, Foreman Emery Brown, and a number of workmen and servants. They were unable successfully to battle with the flames, which menaced the residence from the start.

Refused Big Offer for Place

Within a couple of hours scores of volunteers from the village negotiated the two-mile hill in sleighs, and armed with buckets and wet blankets were fighting to save the great barn and the servants' house. Several times these caught fire, and late tonight there was still danger they would be destroyed.

Major Osgood, until the outbreak of the war, a physician at Cohasset, went to France with the first Harvard unit and was for a time on duty at the Dardanelles. He served several months and returned broken in health and bought the place here. He expended much money in putting it into shape, spending much of his time here.

At present he is taking a course at the Harvard Graduate School of Business Administration.

Within a month Major Osgood was offered $45,000 for the place, but refused it.

No Postponing of Income Tax Payments

WASHINGTON, Dec. 11.—Final decision against any legislation looking to deferment of the income and other tax payments due Dec. 15, was reached today by the Senate finance committee. The full committee thus ratified an earlier decision of the Republican members.

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Here Is a Specimen "Instead-er"
(This illustrates what is meant by an "Instead-er," but is not a part of the contest. "Instead-er" No. 1, to be printed in the Boston Post, Wednesday, December 15, will be a different one.)

"I asked for mince-pie tonight,"
Jim Jinks to his young wife said;
"I asked you to try to make me a pie."
But . . . . instead.
(What Did She Do?)

What DID She Do Instead?
All you have to do is tell what she did instead of making him a pie. She may have made him something else—or she may have made him nothing. There are hundreds of things she might have done instead. There is no rhyming needed. Here are two things she might have done instead.
But *made him a "nightie" instead.*
But *told him to make it himself instead.*
Of course any number of other ideas will suggest themselves to you.

A Different Rhyme Is Printed Each Day. $100 Cash Prize Each Day

Beginning Wednesday, Dec. 15
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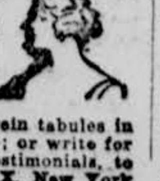

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Don't allow your health to be ruined through a burden of unhealthy fat.
Spend some time daily in the open air; breathe deeply, and get from any druggist a box of Korein tabules (pronounced *koreen*) and follow Korein system simple directions that come with the box.
Weigh and measure yourself every week. Continue reducing steadily until you are down to normal. Korein system is absolutely harmless, is pleasant, and even a few days' treatment has often shown a noticeable reduction.
Korein system has succeeded when other remedies, etc., have failed. It is the delight of those who wish to improve their figure and to acquire a younger, active appearance. Eat all you need; no strenuous exercising. Guarantee that you reduce 10 to 60 pounds (whatever you need to) or your money back. Buy Korein tabules in a box, at any busy pharmacy; or write for free brochure, with many testimonials, to Korein Co., NB-68, Station X, New York

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$15.00 Jeweled and Adjusted
Record-Breaking Watch Value
Here is an exceptional opportunity to secure a really first-class Wrist or Bracelet Watch of solid gold, absolutely guaranteed, a high-grade make, one that will give absolute satisfaction as a timekeeper. Each movement is marked with the number of jewels and adjustments and the entire watch is exquisitely finished and looks the part of a $75 watch. As a matter of fact, Mr. Freiman, president of this company, who financed this big deal for our house, guarantees to refund money if watch can be bought elsewhere for less than $30. These charming little timepieces can be had with the bracelet or extra heavy black ribbed silk ribbon if desired without extra charge.
MAIL ORDERS FILLED
Open Daily Till 6. Sat. Till 9.
LENOX JEWELRY CO
16 Bromfield St., Boston

Advertisement.
Rupture Kills 7,000 Annually
Seven thousand persons each year are laid away—the burial certificate being marked "Rupture." Why? Because the unfortunate ones had neglected themselves or had been merely taking care of the sign (swelling) of the affliction and paying no attention to the cause. What are you doing? Are you neglecting yourself by wearing a truss, appliance, or whatever name you choose to call it? At best, the truss is only a makeshift—a false prop against a collapsing wall—and cannot be expected to act as more than a mere mechanical support. The binding pressure retards blood circulation, thus robbing the weakened muscles of that which they need most—nourishment.
But science has found a way, and every truss sufferer in the land is invited to make a FREE test right in the privacy of their own home. The PLAPAO method is unquestionably the most scientific, logical and successful self-treatment for rupture the world has ever known.
The PLAPAO PAD when adhering closely to the body cannot possibly slip or shift out of place, therefore, cannot chafe or pinch. Soft as velvet—easy to apply—inexpensive. To be used whilst you work and whilst you sleep. No straps, buckles or springs attached.
Learn how to close the hernial opening as nature intended so the rupture CAN'T come down. Send your name today to PLAPAO CO., Block 507, St. Louis, Mo., for FREE trial Plapao and the information necessary.

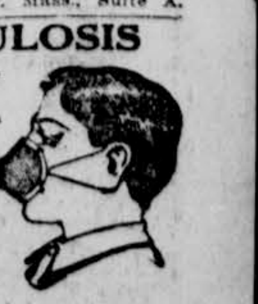
Advertisement.
What To Do For Headaches
Whatever Its Cause Orangeine Brings Blessed Relief Invariably and Almost Instantly
And Five Minutes Ago I Thought My Head Would Break in Two—Orangeine Is Certainly a Friend of Mine
When you feel a headache coming, step into any drug store and get a package of ORANGEINE. This will relieve the tension. If it is one of those periodic headaches that call for rest, ORANGEINE will ward off the severe pain and bring you through, refreshed, instead of the hard, three-day battle that has been the experience of most sufferers.
Headache may arise from any one of many different causes but it is a headache, none the less, and relief is an imperative necessity. ORANGEINE is this one reliable infallible relief and one or two doses is always enough. Try one 25-cent package of ORANGEINE and you will then know what to do whenever you feel the symptoms of an oncoming headache. And if the ache gets you first, if it acts as if it would drive you frantic, you will know that relief will come just as soon as you get your ORANGEINE. It is perfectly safe and the formula is printed plainly with every package. Don't forget ORANGEINE: in either tablets or powders.

Dont Send 1 Penny
Just send your name and address, size and color and I will send this sweater to you. You don't pay one penny until it is delivered to your door by the postman.
$1.98
Army Navy For Men or Women
This is a real heavy winter sweater, made of heavy mixed marino yarn. Slip-over style, with V neck and full length sleeves. Just like picture. Will give excellent wear. Sizes to fit Ladies or Men 34 to 46. Colors, khaki or navy blue.
$4.50 Reduced to $1.98
No one has ever reduced price to this extent. It is the biggest money-saving bargain ever offered. We will sell only two to a customer and will not sell to merchants or wholesalers.
Delivery Free Just send your name and address, no money. When the sweater is delivered at your door by the postman, pay him $1.98 for the sweater. We have paid the delivery charges. Wear it. If you don't find it all you expect, return it and we will cheerfully refund your money at once. Order by No. 72.
WALTER FIELD CO.
Dept. Z-2103, 318 S. Michigan Ave., Chicago

FITS!
"Let those that don't believe write me," says G. A. Duckworth, Norwood, Ga., telling what Dr. Grant's Treatment for Epilepsy, Fits and Falling Sickness did for his son. Used for over 20 years with great success. Many who had given up all hope say Dr. Grant's Treatment cured them. Scores of similar letters from all parts of the country.
$2.00 FREE Bottle
of this wonderful treatment sent to every man, woman and child suffering from this terrible affliction. Write at once, giving age, how long afflicted, full name and express office. Send today. DR. F. E. GRANT CO., Dept. 713, Kansas City, Mo.

Stop Colds
Salicon TABLETS
Do not affect the heart nor upset the stomach
Send 2-cent stamp for free sample bottle.
K. A. HUGHES CO., Boston 19, Mass.

URIC ACID NEVER CAUSED RHEUMATISM
MY FREE BOOK explains what does
No matter what your present condition, if you suffer with rheumatism, neuralgia, neuritis, lumbago, sciatica, rheumatoid arthritis or gout.
Write for my book. Thousands say "It is the most wonderful book ever written."
Dont' sent a stamp—it's FREE.
Write to Frederick Dugdale, M. D., 372 Boylston St., Boston 17, Mass., Suite A.



TUBERCULOSIS
Dr. Glass has positive proof that he has discovered a successful remedy for tuberculosis by inhalation, in any climate. For further information address
The T. F. Glass Inhalant Company, Mason Bldg., Los Angeles, Calif.

Discovery of a Non-Phosphorescent, Highly Fluorescent Crystal.

Until quite recently the scientific world, and particularly those who have devoted time and study to the nature and theories of Roentgen rays, has accepted as a conclusion that fluorescent crystals could not be otherwise than phosphorescent. After a long series of experiments, carried on in the Spring Park Laboratory, Jamaica Plain, Mass., by Mr. T. B. Kinraid, a combination of chemical elements was found which is much greater in fluorescent power than tungstate of calcium or any of the other salts, and is absolutely non-phosphorescent. So fully is the attribute of phosphorescence eliminated, that when the screen, composed of fluorescent crystals, is exposed to the rays of the tube the effect is instantaneous, showing the most vague shadows, which can not be traced when tungstate of calcium is used.

This discovery is likely to prove of great value in the practical application of X rays, and particularly in medical diagnosis its good qualities will be realized, because the perfect control of the rays are possible, and no after-glow on the screen remains.

A representative of the ELECTRICAL REVIEW was permitted by Mr. Kinraid to witness a demonstration of the results accomplished with this new non-phosphorescent crystal in the experimenting-room of the Spring Park Laboratory.

◆

Electric Headlights.

Besides the main function of the electric locomotive headlight—to illuminate the road for the benefit of the engineer—it is a peculiarity of the beautiful arc light, backed by a powerful reflector, according to the *Railroad Gazette*, that it gives early notice to station men, wayfarers, runners of other trains, tramps and rabbits of the approach of the train bearing the light. In a number of instances this has been strikingly illustrated in the prevention of collision. The runner using this light can not see through a hill or a building any better than without it, but by shining above the hill or building the light will make its whereabouts manifested several miles in advance, so that other trains can know that the electrically-lighted train is approaching.

The illumination of particles of dust or moisture in the atmosphere makes a pencil of light, which, if the angle of the reflector is adjusted properly, may be seen in the air overhead many miles away, and this often makes an intelligible indication to runners of other trains, even if, by reason of a curve in the track between the observer and the point where the light is at that moment, the pencil is some distance from the line of the road.

The general manager of the Cincinnati, Hamilton & Dayton road is authority for the accuracy of the following report of an instance illustrating the value of this feature of the light: An engineer, running an unloaded engine at night, and with the tender foremost, forgot about a passenger train that was due, and would have met it on the bridge, over the Miami River at Hamilton, had he not seen the light from the electric headlight of the passenger engine before the latter could itself be noticed even during the daytime. The engineer succeeded in running back onto a sidetrack before the passenger train reached him.

◆

PERSONAL.

Mr. J. George Kaelber, of the Western Electric Company, was among the visitors to New York city last week.

Mr. B. J. Arnold, of Chicago, was a recent visitor to New York city, making his headquarters at the new Manhattan Hotel.

Lieut. Frank H. Clark, general manager of the United States Electric Lighting Company, of Washington, D. C., visited New York city last week.

Mr. J. F. Outwater, purchasing agent for the Edison Electric Illuminating Company of Brooklyn, N. Y., is convalescing from a severe attack of the grip.

Mr. M. L. Livingston, assistant manager of the Standard Thermometer and Electric Company, Peabody, Mass., visited New York city last week and favored the ELECTRICAL REVIEW office with a call.

Mr. T. C. Rafferty, who is probably one of the best known men in the electrical supply business in the country, is now associated with the Metropolitan Electric Company, of Chicago, having disposed of all his other electrical interests. All of Mr. Rafferty's friends and customers will undoubtedly be pleased to learn of his new connection, which will afford him ample scope for his energetic work, enabling him to take care of his customers' wants in a befitting manner, and renew old and pleasant trade relations. The ELECTRICAL REVIEW wishes him every success in his new work and congratulates the Metropolitan Electric Company on their foresight in securing his services.

◆

Trolley Car Knocked Through a House.

A press dispatch from Wilkesbarre, Pa., says that an empty passenger car attached to a freight train on the Wilkesbarre & Northern Railroad broke its coupling on January 9, near Dallas, and dashed down a heavy grade for several miles. When nearing Luzerne borough at a crossing, and at a frightful rate of speed, it came into collision with a trolley car. The force of the collision hurled the trolley car through the side of a dwelling house, and one passenger, David Smith, was fatally injured. Two brakemen were on the passenger coach, and they put on the brakes, but the chains refused to work and they jumped to save their lives. The passengers in the electric car saw the danger ahead and made a rush for the doors. All escaped injury, with the exception of Smith, who was dug out of the wreck.

A Big Niagara Falls Electrical Contract.

At a meeting of the directors of the Cataract Construction Company, at Niagara Falls, on January 12 a contract for five new generators of 5,000 horse-power each and corresponding exciters and switchboard apparatus was awarded to the Westinghouse Electric and Manufacturing Company, of Pittsburgh. This is the largest single contract for electrical power apparatus ever placed, and it is understood that it amounts to about half a million dollars. It constitutes the second great step in the installation of the Niagara plant, adding 25,000 horse-power to its present output. The new generators, together with the ones now in use, will make provision for furnishing to the city of Buffalo the additional power that is required for manufacturing, lighting and industrial purposes, and it is estimated that eventually from 25,000 to 40,000 horse-power will be consumed in Buffalo alone. The five generators are to be duplicates of the three already installed by the Westinghouse company. A further increase of 10,000 horse-power is contemplated in the near future.

◆

American Air-Brakes in Germany.

The first 1897 order received by the Standard Air-Brake Company, of New York city, was one for 30 double-truck motor car air-brake equipments for Germany. The name of the line on which this apparatus is to be used is Oberschlesische Dampfstrassenbahn, but the brakes will only be used on the cars and not on the name. The Standard Air-Brake Company's motor-compressor type will be supplied, and there is another order for 30 more to come, making 60 car equipments in all. Mr. E. J. Wessels, general manager of the company, is feeling much encouraged over the outlook for foreign trade, requests for over 300 additional equipments having been received during the past week.

◆

Packard Lamp Trade.

Notwithstanding the advance in the selling price of the standard makes of lamps, made necessary largely by the fact that the manufacturers have been operating under an actual loss for the past two years, the Electric Appliance Company, of Chicago, report that the sales on Packard lamps have increased since the time of the advance, showing that their customers appreciate a good thing and are willing to pay a fair price for a first-class article. The Packard lamp business has always been a very satisfactory part of the Electric Appliance Company's trade.

◆

Length of the Roentgen Ray.

The wave length of Roentgen rays has been ascertained by Dr. Fromm, of Munich, at fourteen-millionths of a millimetre; that is about 75 times smaller than the smallest wave length for light. This determination was based upon interference phenomena observed by Dr. Fromm, says the *Scientific American*.

THE EQUIPMENT OF MANUFACTURING ESTABLISHMENTS WITH ELECTRIC MOTORS AND ELECTRIC POWER DISTRIBUTION.

READ BEFORE THE WESTERN SOCIETY OF ENGINEERS, DECEMBER 9, 1896, BY PROF. DUGALD C. JACKSON.

The theoretical treatment which this subject has heretofore received in papers before technical societies or articles in current periodicals has always appeared to me to be inadequate, and I have therefore undertaken to give a summary of the views held in a number of the great manufacturing establishments where experience has been had with electrical transmission and distribution of power. In a considerable proportion of these establishments electric power transmission has been used side by side with the mechanical transmission of power from the prime mover to the operating machinery. I propose to deal specially with the conditions which exist in establishments owning and operating their own complete and independent power plant.

The points to be considered in a comparison between mechanical and electrical distribution of power in manufacturing establishments, by which the advantages of one or the other are to be determined, are:

A. Comparative first cost.

B. Comparative operating advantages: 1, annual expense for fuel; 2, annual expense for attendance; 3, annual expense for repairs; 4, frequency and duration of breakdowns, and extent of the whole plant which is likely to be affected by a failure of any part; 5, convenience, as it affects the extent of floor space occupied by machinery; 6, convenience, as it affects the handling of product at the machines and to or from the machines, and the amount of product put through the machines; 7, safety; 8, cleanliness.

I will take these points up in their order.

A—COMPARATIVE FIRST COST OF ELECTRICAL AND OF MECHANICAL TRANSMISSION.

In the Case of a New Establishment—The first cost of electrical transmission within the confines of a manufacturing establishment which has its own independent and complete power plant is nearly always considerably greater than the first cost of mechanical transmission, such as by gears and shafting, belts and shafting, or ropes and shafting. In each case the steam plant is required. In the electrical equipment the required parts in addition to steam plant are electrical generators, electrical wiring, electric motors. These are considerably more costly under ordinary conditions than belts and shafts or other mechanical transmitters, even if we acknowledge an advantage in the efficiency of the electrical plant which permits a reduction of the total capacity of the steam plant when electrical transmission is used.

The electrical equipment being, under ordinary conditions, more costly, it must make sufficient annual savings to pay a profit on its extra first cost, or it has no reason for its existence.

In the Case of an Established Concern—The considerations of the last paragraph apply with extreme force

(Continued on page 35.)

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Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents a line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting. Grant; see p. 16.

Caliper cat. free. E. G. Smith, Columbia, Pa.

Forming lathes. Mer.Mach.T.Co., Meriden, Ct.

Boiler-maker's punch and shears wanted, at Dover Boiler Works, Dover, N. J.

The Dutton Wet Twist Drill Grinder is sold by the Garvin Machine Co., New York City.

Light and fine mach'y to order; models and elec. work specialty. E. O. Chase, Newark, N. J.

Book "Dies and Diemaking," price $1, post paid. J.L.Lucas, Prov., R.I. Send for index sheet.

Selden Packing for stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., New York.

For Sale—Repair shop in good town of 5,000; good tools, in rented building, $2,000; terms to suit. Address S. G. Hunter, Atlantic, Iowa.

Second-hand books, cheap; scientific, mechanical, miscellaneous; catalogs free; send postal for one. Industrial Pub. Co., 16 Thomas st., New York.

Bound volumes of "American Machinist" for 1893 and 1894, cloth, good condition, $3 each; one of 1888, morocco, $4. "Volumes," care AMERICAN MACHINIST.

Building to rent, 176x75 ft., R. R. siding, with or without power, only 17 miles from New York city, on Central R. R. of N. J. Box 13, AMERICAN MACHINIST.

The Waltham Machine Works, Waltham, Mass., make a specialty of accurate work. Correspondence in regard to small automatic machinery, punches and dies, etc., is solicited.

Institutions retiring from business having machine tools, brass or wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

Wants.

Situations and Help Advertisements only inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisement under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recommendation or other papers of value should not be inclosed to unknown correspondents.

Situations Wanted.

Young mechanical draftsman, with 5 years' shop experience, desires change. Box 25, AMERICAN MACHINIST.

Wanted—Situation; competent mechanical draftsman; detail work preferred; references. Box 350, AMERICAN MACHINIST.

An A1 blacksmith desires a position as foreman; age 30; 12 years' experience. Address Box 24, AMERICAN MACHINIST.

A good machine blacksmith desires a change; either light or heavy work. Address Box 23, AMERICAN MACHINIST.

Draftsman wants change; four years' experience on cotton machinery; references furnished. Box 18, AMERICAN MACHINIST.

Designer of machine tools, with 14 years' experience (shop and drawing), open for position. Box 26, AMERICAN MACHINIST.

First-class, experienced pattern-maker desires a change; steady position preferred, and located in the East. Box 29, AMER. MACH.

Experienced draftsman wants change; N. Y. city preferred; steam and gas engines and heavy machinery. Box 17, AMER. MACHINIST.

General utility man, practical cost accountant; experience as draftsman and purchasing agent; technical graduate. Box 14, AMERICAN MACHINIST.

Wanted—Position as foreman of machine shop, by a thorough, practical mechanic; one who can handle men. Address Box 22, AMERICAN MACHINIST.

Foreman pattern-maker, 36, desires to change; experienced on marine engine and machine work; good draftsman. Box 20, AMERICAN MACHINIST.

Machinist and technical graduate desires position in machine shop or with manufacturing company; chance for promotion. Box 348, AMERICAN MACHINIST.

A man with experience as designer, manager and selling agent, machine tools and textile machinery, wants position; satisfactory references as to all points. Address Box 19, AMERICAN MACHINIST.

Situation, by a thorough mechanic with shop drawing-room and traveling experience in machine tools; can add new line of profitable machines with right parties. Address Box 12, AMERICAN MACHINIST.

As superintendent of manufacturing plant; good executive ability and successful manager of men; can introduce systematic and economical methods; presses, dies and sheet-metal working machinery a specialty. Address Box 21, AMERICAN MACHINIST.

Young man of thorough experience in the application of up-to-date methods, able to design and produce cost-reducing tools, jigs, etc., at present holding responsible position, open for position as foreman or assistant superintendent. Box 27, AMER. MACHINIST.

Mechanical engineer and draftsman, 7 years' shop experience and 9 years' drawing-room experience; well posted on hydraulic and heavy power-transmitting machinery; permanent position desired; first-class reference furnished. Address Box 30, AM. MACH.

Help Wanted.

Wanted—A No. 1 draftsman and designer; one who has had experience on electric traveling crane work. Address Box 16, A. MACH.

Several first-class tool makers wanted on light interchangeable work; state age, experience and wages expected. Box 28, AMERICAN MACHINIST.

Wanted—Mechanical draftsman, familiar with Corliss engine work; state training, experience, age and salary expected; also give references. The Bass Foundry & Machine Co., Fort Wayne, Ind.

Working foreman wanted for a small machine shop in a Connecticut city; must be acquainted with small engine work and an all-round man of good habits. Address Box 15, AMERICAN MACHINIST.

Wanted—Competent man for superintendent of factory employing 350 men and boys; must be thorough mechanic and understand fully screw machines and screw-machine products. Address, giving experience and salary expected, "Screws," care AMER. MACH.

Wanted—Foreman, by an old, reliable firm in the steam fittings and brass goods line in the center of Germany, for brass foundry employing about 70 men; knowledge of German language required; state experience, age and wages expected. Box 335, AMER. MACHINIST.

Draftsman Wanted—A steady position is open to a draftsman capable of designing machinery under advice; must have some acquaintance with modern shop methods; applicants will please give full particulars, such as age, salary required, experience, etc. Box 10, AMERICAN MACHINIST.

Wanted—Draftsman with thorough machine-tool building experience, thoroughly familiar with shop drawings and designing of metal-working machines; state experience, wages expected, references, etc. A permanent position in New England for the proper man. Box 11, AMERICAN MACHINIST.

Wanted—A thoroughly practical and experienced draftsman and tool-maker who is capable of designing and making tools and jigs to turn out a piece of mechanism on the lines of a watch made of brass in the most modern and economical way; state age, experience and salary demanded. Box 333, AMERICAN MACHINIST.

The Delaware, Lackawanna & Western Railway has issued an order forbidding its employees to engage in outside business. It is aimed at a number of the foremen who are interested in general stores and have been exerting their influence to make the men under them patronize these stores.

A New Induction Coil.

An induction coil of great power has been invented by Mr. T. B. Kinraid, of the Spring Park Laboratory, Jamaica Plain, Mass. The coil, which is described as unique in its form, was described by the inventor at a recent meeting of the Society of Arts of the Massachusetts Institute of Technology. By the aid of the coil some interesting studies have been made of the differences in the character of electric discharges from the positive and negative poles. Photographic plates were balanced on the point of discharge, and, after operating the coil in a dark room, the plates were developed. At the lecture the apparatus was shown in operation, and the developed plates were shown by means of the lantern. The figures are described as being of extraordinary size, beauty, and delicacy of detail. It is thought that designers and decorators may obtain useful suggestions from them.

Personal.

Mr. J. S. Taylor, of the firm of Taylor & Challen, engineers, of Birmingham, England, is visiting here for about six weeks.

The American Academy of Arts and Sciences has awarded to Charles F. Brush, of Cleveland, the Rumford Medals "for practical development of arc lighting."

The Royal Institution of Great Britain, in commemoration of its centenary, has elected as honorary member, among others, Prof. R. H. Thurston, director of Sibley College, Cornell University.

Messrs. H. S. Mosher and J. I. Copeland, of Chicago, recently sailed for Europe, where they expect to stay about three months with the purpose of conducting some practical exhibitions of pneumatic riveting at some of the large shipbuilding yards in England and Scotland. These exhibitions will be carried on in the interests of the Chicago Pneumatic Tool Company, Chicago.

At 5:45 P. M., the 26th ult., a Winton automobile arrived in front of the Astor House in this city, having traveled from Cleveland, Ohio (where it was built by the Winton Motor Carriage Company), in 40 hours 4 minutes running time, and 105 hours 45 minutes elapsed time. The Winton carriage is of the heavier class of gasoline-propelled vehicles and uses only one cylinder. The expense of the trip of 707 miles for fuel is given as "less than a dollar." Some of the roads traversed between Buffalo and Albany are described as fit to disgrace central Africa, and at one point of the journey an accident resulted in a broken forward axle, so that another one had to be sent by express from the factory.

We Make Boring Machines, Milling Machines, Special Tools, BEAMAN & SMITH, Providence, R. I.

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Kindred.... ...Interests

R. S. Hale has opened an office at 31 Milk street, Boston, for the practice of steam, mechanical and other branches of engineering.

Removal.—"The Official Railway Equipment Register" and "The Pocket List of Railroad Officials" have been removed to Room 17, at 24 Park place, New York city, owing to the need for increased facilities.

The Armorite Interior Conduit Company, 478 Fort street, West, Detroit, Mich., has issued a new circular and price-list of the company's steel Armorite conduit, manufactured under the Cummings patents. In this circular notice is also given that the Armorite conduit is approved by the National Board of Fire Underwriters.

Thomas Hill, Jr., electrical manufacturer and contractor, 128 Water street, New York city, has just completed arrangements by which he will represent, in the New England States and in the territory as far west as Syracuse, N. Y., the Ahlm-Edwards Electric Company, of Medina, Ohio. This company manufactures multipolar dynamos and motors.

The Metropolitan Electric Company, of Chicago, has been given the agency for the Thompson–Brown arc light hanger-board. This is claimed to be one of the best hanger-boards on the market, is neat, well built, of good mechanical construction, and a good seller, filling all the requirements of the underwriters, and one that it is expected will meet the approval of the best electricians.

The Forest City Electric Company, Cleveland, Ohio, have recently issued a very handsome catalogue describing their well known "roll-drop" and drop-forged commutator bars. The catalogue is printed in three colors and is a splendid example of the printers' art. The testimonials included in the catalogue are of the highest character and should be of great service to the Forest City Electric Company.

Elmer P. Morris, manufacturers' agent, has removed his offices from 36 Dey street, New York city, to Rooms 40, 41 and 42 Smith Building, 15 Cortlandt street, where he has secured the increased facilities which his rapidly growing business has recently made necessary. Mr. Morris represents a popular line of specialties, and his many friends will be glad to hear of his increasing success.

The Conover-Goe Company, Chicago, reports that its introductory sales of the Hartford switch are very gratifying. They are now showing an indicating switch that will, no doubt, find favor with consumers, on account of its simplicity and small additional cost over the price of an ordinary switch. This company is also the sales agent for the Dicke Tool Company, and is filling many orders for construction and linemen's tools.

The American Electric Telephone Company is getting its new and commodious suite of offices and showrooms gradually into presentable shape at 171–173 South Canal street, Chicago, it proving quite a task to attend to the many details incidental to moving a concern of this kind without neglecting any of the numerous demands for apparatus that are constantly coming in. Mr. H. C. Dodge, who, as manager of the Standard Telephone and Electric Company, became well and favorably known to the telephone world, has become associated with the American Electric Telephone Company, Chicago, as general manager. The company is to be congratulated on securing the services of Mr. Dodge, who will doubtless find many opportunities for exercising his executive ability in his new field of work.

"Cahall" Water Tube Boiler.—The fourth edition of the Cahall sales department's catalogue has just been issued and is now being distributed from the company's Pittsburgh office. It is a splendidly gotten up book of 98 pages, and should really be called a treatise on water-tube boilers instead of a catalogue. While the work treats of only one subject, "Cahall" boilers, this is handled in such an interesting, almost fascinating manner as to hold the attention of the most unwilling reader. To a certain extent this is perhaps due to the excellent typographical get up of the work. In addition to a complete description of the several types of boilers and accessories manufactured by the company, the book contains valuable data and results of tests, which will prove useful and interesting to any steam user.

After a year's study and experiment on fluorescent crystals by numerous investigators, it is thought by a great many scientists that the most important advance along this line is the fluorescent crystal discovered by Mr. T. B. Kinraide, at the Spring Park Laboratory, Jamaica Plain, Mass. These fluoroscopes and fluorescent screens are replacing in a great many hospitals and laboratories those made of tungstate of calcium, and wherever the value of this fluorescent salt is known they are being adopted. For X-ray photographic work it accomplishes the result of showing each image undimmed by the phosphorescence or previous exposure, having a peculiar volume and intensity of light with the perfectness of definition. This same result is obtained to a degree by the use of platinocyanide of barium, but this crystal, owing probably to molecular decomposition caused by the X rays, changes and loses its power after a little use.

Prizes for Two Inventors—A highly interesting competition between a large number of new inventions has just been decided by a very distinguished board of awards, and a handsome cash prize and solid gold medal awarded as the result of the decision. For some time the patent firm of John Wedderburn & Company, of Washington, D. C., have given a monthly reward of $150 to the inventor who should submit the best invention from the standpoint of simplicity, novelty and utility. The Board of Awards, composed of Senator William Stewart, of Nevada, chairman; Representative Claude A. Swanson, of Virginia; Mr. John C. Eckloff, cashier of the Second National Bank of Washington, and Messrs. A. C. Moses, of W. B. Moses's Sons and Frederick E. Woodward, of Woodward & Lothrop, two of the leading merchants of the capital city. This board has just selected the prize winners in the contest participated in by inventors who submitted their devices during the month of January. The prize of $150 goes to William Taylor, of Kearney, N. J., the inventor of a bicycle brake of simple construction, and the gold medal to Theodore G. Thomas, of Lamarque, Tex., for a monkey wrench of novel design.

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The Steam Engineering course is intended to qualify engineers to secure Licenses.
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RELIABLE RINGER
Send for New Catalogue.
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MANUFACTURERS,
286-90 Graham St BROOKLYN, N. Y.

ROYCE & MAREAN,
DEALERS IN
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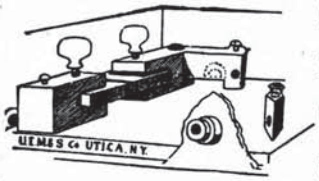
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Kindred.... ...Interests

Mr. Luther Stieringer has removed his offices from the Morris Building, in Broad street, to the new Beard Building, 120 Liberty street, New York city.

It is said that the new X-ray apparatus now in course of completion at the Spring Park Laboratory, Jamaica Plain, Mass., under the direction of Professor T. B. Kinraide, permits a person to stand with the back to the Crookes tube, and with the fluoroscope examine his own anatomy.

The B. & O. Railroad has made two important lake connections, one to Duluth and the northwest, via Northern Steamship line, and the other to Chicago and Milwaukee, via the Owen line, through Fairport, Ohio. Fairport is the Lake Erie terminus of the Pittsburgh & Western Railroad, which, as is well known, is practically a B. & O. property, although under separate management.

A Presidential Car—The *Railroad Car Journal*, a publication devoted to the car-building industry, has originated a project to build a private car for the use of the President of the United States, from material and appliances contributed for the purpose by the car-building and affiliated industries. It is proposed to construct a private car, excelling anything of this kind which has been done before, in the substantial character of its construction and in the completeness and convenience of its furnishings and decorations.

The American Engine Company, of Bound Brook, N. J., seem to be enjoying quite a boom under the management of Mr. Frank H. Ball. Since the first of the year it has been found necessary to increase the capacity of their works, and now they are installing a regular all-night working force, so that their establishment will run night and day hereafter. Among the recent shipments they report the following:

Cincinnati *Commercial Tribune*, one 18-kilowatt dynamo.

Cliff Paper Company, one 50-horse-power motor, one 25-horse-power motor.

Daily States Publishing Company, one 12-horse-power motor.

Toledo *Blade*, one 12-horse-power motor.

Cleveland *Plain Dealer*, one 25-kilowatt dynamo.

Bridgeport *Post*, one 9-kilowatt dynamo.

Rochester *Times*, one 12-horse-power motor.

Daily and Weekly *News*, one 25-horse-power motor.

Baton Rouge *Advocate* one 5-horse-power motor.

Hartford *Post*, one 25-horse-power motor.

Kansas *Farmer*, one 12-horse-power motor.

The Register company, one 15-horse-power motor.

Syracuse *Standard*, one 9-kilowatt dynamo.

The St. Louis *Star*, one 50-horse-power motor.

Weaver–Costello company, one 9-kilowatt dynamo.

Minneapolis *Journal*, one 14 by 12 American–Ball engine.

Pennsylvania Silk Company, one 10 by 10 American–Ball engine.

Vacation Days.

In the Lake Regions of Wisconsin, Northern Michigan, Minnesota, Iowa and South Dakota, along the lines of the Chicago, Milwaukee & St. Paul Railway, are hundreds of charming localities, pre-eminently fitted for Summer homes, nearly all of which are located on or near lakes which have not been fished out. These resorts range in variety from the "full dress for dinner" to the flannel-shirt costume for every meal. Among the list are names familiar to many of our readers as the perfection of Northern Summer resorts. Nearly all of the Wisconsin points of interest are within a short distance from Chicago or Milwaukee, and none of them are so far away from the "busy marts of civilization" that they can not be reached in a few hours of travel, by frequent trains over the finest road in the Northwest—the Chicago, Milwaukee & St. Paul Railway. Send a two-cent stamp for a copy of "Vacation Days", giving a description of the principal resorts, and a list of Summer hotels and boarding houses, and rates for board, to Geo. H. Heafford, G. P. A., Chicago, Ill.

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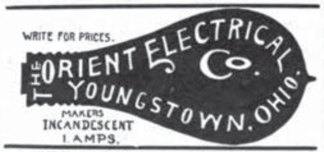
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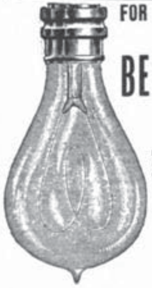

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Until further notice experimental apparatus will be furnished *free* to students. Send for Free Circular and Book of Testimonials, stating the subject you wish to study, to
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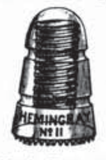

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No. 11, Double Groove Pony Insulator.
HIGH INSULATION.
The most perfect Glass Insulator made is the Teat Insulator.
"The Teats on the lower rim of the petticoat attract the water on the outer and inner surfaces of the Insulator into drops. The water drops from these points on to the cross-arm, thereby preventing the moisture from creeping to the pin."
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FOR SALE.

RAILWAY GENERATORS.

3 M. P. 500, 666 horse-power, 500-volt generators with station equipments.
4 D 62, 80 horse-power, 500-volt generators with station equipments.
4 M. P. 75, 100 horse-power, 500-volt generators with station equipments.
1 D 50, 55 horse-power, 220-volt generator with station equipment.

RAILWAY MOTORS.

10 W. P. 50, 25 horse-power motors.
15 F. 30, 15 horse-power motors.
20 G. E. 800 drum armatures, 4 turn. New.

STATIONARY MOTORS.

1	1½	horse-power,	110-volt,		Thomson-Houston.
1	1½	"	220	"	Robinson-Foster.
2	½	"	220	"	Edison.
1	3	"	220	"	Edison.
1	3	"	220	"	Thomson-Houston.
1	15	"	220	"	Belknap. New.
2	1	"	500	"	Ketchum. New.
1	5	"	500	"	Eddy.
1	5	"	500	"	C. & C.
1	¾	"	110	"	Thomson-Houston.
1	3	"	110	"	Thomson-Houston.
1	1¾	"	220	"	C. & C.
1	5	"	220	"	Am. Eng. Co. New.
1	50	"	220	"	Thomson-Houston.
1	10	"	500	"	Edison.

And many other motors not mentioned above.
All motors have sliding base frames and fire-proof rheostats.

ELECTRIC PUMP.

A 10-horse-power, 500-volt Thomson-Houston motor, direct connected to Gould pump, capacity, 10,000 gallons per hour.

TRANSFORMERS.

A large lot of Stanley transformers, from 15-light to 100-light, 1,000-volt primary; part 50-volt secondary, and part 100-volt secondary.

125-VOLT INCANDESCENT DYNAMOS.

4	6	Kilowatt,	110-light,		Edison.	
3	12	"	210	"	"	
1	15	"	270	"	"	
2	20	"	360	"	"	
1	30	"	540	"	"	
1	7½	"	125	"	T.-H.	
1	3	"	55	"	"	
1	8	"	125	"	"	"C. I."
1	16	"	275	"	"	"E. I." type.
1	25	"	450	"	Edison.	
3	30	"	540	"	T.-H.	"H. I." "
1	1,000-light M. P., Westinghouse.					

ALTERNATING DYNAMOS.

1	A 35,	650-light,	Thomson-Houston.
1	A 70,	1,300 "	"
2		650-light,	Westinghouse.
2		750 "	"
1		1,500 "	"
3		1,000 "	"

The above are all 1,000-volt machines, and are complete with exciters and station equipment.

ARC DYNAMOS.

1	5-light,		2,000	candle-power,	Brush.	
1	5	"	1,200	"	"	
1	20	"	2,000	"	"	
4	30	"	2,000	"	"	
1	45	"	1,200	"	"	New.
1	65	"	2,000	"	"	
2	50	"	2,000	"	Thomson-Houston.	
4	45	"	1,200	"	"	
1	80	"	2,000	"	"	
2	30	"	1,200	"	"	
1	75	"	1,200	"	"	

ARC LAMPS.

15 K. 12, 1,200 candle-power, single, Thomson-Houston.
10 1,200 candle-power, single. Brush.
27 No. 17, 1,200 candle-power, double Brush.

EVERY MACHINE TESTED AND GUARANTEED.

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was lengthened until the number of spots appearing on the photographic plate was identical with the number shown in the photograph of the X ray. In this way was obtained the amount of resistance of a Crookes tube.

"The impression of each spark on the plate shows that the amount of time represented between them, corresponding to the oscillation, is about one-ten-millionth of a second, and shows each spark made up of 10 or 12 sparks.

"This experiment of getting negatives of sparks under different pressure and the comparative study shows conclusively the amount of resistance offered by the various elements to the current, and also shows that when the tube is giving out X rays the current is oscillating."

"What are the most important theories which you have deduced from this line of experiment?" asked the interviewer.

"I think the important conclusions," replied Professor Trowbridge, "are that I have been able to determine the energy in terms of horse-power. One million horse-power in one-ten-millionth of a second is the energy required to produce the X ray. In view of this great power, it is not strange that X rays will pierce flesh and brick walls. I have also found that when the electrical discharge is forced across a vacuum by a great pressure, the vacuum breaks and is a good conductor, and, at the moment before the discharge goes, from one end of the tube to the opposite the greatest resistance exists, while at the instant of transversing the resistance is practically broken. And still another point I have demonstrated is that a spark eight inches long does not encounter more resistance than a spark one inch long."

The Underground Trolley in New York City.

On March 20 the New York State Railroad Commissioners granted permission to the Metropolitan Street Railway Company, the Central Park, North and East River Railway Company, the Eighth Avenue Railway Company, the Ninth Avenue Railroad Company and the Sixth Avenue Railroad Company to use the underground trolley system on their roads. The decision covers about 40 miles of street railroads in New York city upon which the motive power is to be changed. As soon as the consent of the Commissioner of Public Works for tearing up the streets is obtained, work involving the expenditure of between $6 000,000 and $7,000,000 will be commenced.

Mr. M. L. Livingston, of the Standard Thermometer and Electric Company, Peabody, Mass., has made a flying trip to Syracuse and Rochester and through New York State, making arrangements for the introduction of the new Upton "Midget" inclosed arc lamp. Mr. Livingston left Chicago within the past year, where he had been indentified with the American Glue Corporation, and prior to that with the *Northwestern Lumberman*, to accept his present connection with the Standard Thermometer and Electric Company as assistant business manager.

An Improved High-Frequency Coil.

To one who has investigated the various methods of exciting X-ray tubes, the early difficulties encountered in making an efficient tube seems not so surprising. The only instrument then available for excitation being the induction coil, it was then, as it is now, an extremely delicate undertaking to secure and maintain the right degree of vacuum.

Both manufacturers and manipulators of the induction coil agree that the correct exhaustion is the all-important consideration. This difficulty, being apparently insurmountable, induced the laboratory department of the L. E. Knott Apparatus Company, of Boston, to continue its investigations, in order to still further perfect the high-frequency coil. It was early shown that with this instrument the question of vacuum was not of such great importance as had been supposed, the rapidity of discharge being sufficient to produce good X-ray power with any reasonable degree of exhaustion.

During these investigations a new and simple method of discharging the condenser with uniformity and rapidity was developed. The early coils of Hertz, Tesla and others employed numerous devices for producing this effect, some of which were quite complicated. With these devices the "tuning" or changing the capacity of the condenser to meet the varying conditions of the current was a difficult undertaking. Fortunately this new device rendered this entirely unnecessary, as it was found by the L. E. Knott Company that the rapidity and power of discharge could be easily regulated by simply closing or opening the spark gap. It is believed that it is this device which has made the high-frequency Tesla coil one of the most successful X-ray generators and a practical instrument for hospital and surgical use.

Since this coil may be operated by an alternating current, it has been supposed by some that sharp definition was not to be obtained. The results of many well known investigators, among whom are Mr. O. B. Shallenberger, of Rochester, Pa., and Dr. F. F. Strong, of Boston, prove beyond question the error of this belief. In fact, looked at from the standpoint of penetrating power, clear definition, ease and convenience of operating, the high-frequency coil commends itself to all practical workers.

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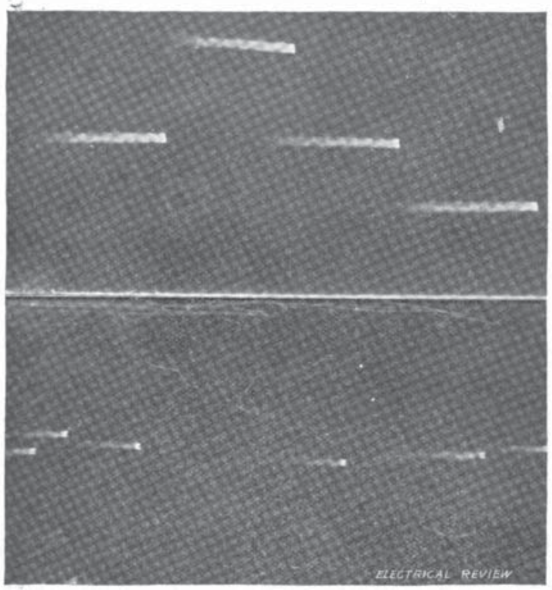
A New Form of X-Ray Apparatus.

At the Spring Park Laboratory, Jamaica Plain, Mass., Mr. T. B. Kinraide has completed a somewhat radically new form of X-ray apparatus, which will permit a new method of supplying the current. The improvement principally is in the method of constructing the coil. The apparatus consists of an induction coil, in appearance like the ordinary coil, and a rotary, which may be mounted on the shaft of a hand-power dynamo supplying current for operating the coil. The plan of the apparatus is a portable outfit, such as one or two men could carry, which might be used by surgeons or hospitals or for army use. When operated by two men it is said that it will give more power than any X-ray apparatus yet made. The machine may be used with any voltage, and a feature is the perfect control of the discharge, which is of very high potential, through a tube which may be varied from the most powerful, passing through bone and flesh, or may be reduced until the flesh is merely opaque, and the vacuum in the tube being extremely high, perfect definition is obtained.



THE ENERGY OF THE X RAY.—THE TOP PICTURE SHOWS A PHOTOGRAPH OF A SPARK DISCHARGED IN A VACUOUS BULB. THE LOWER ONE SHOWS A SPARK DISCHARGED IN HYDROGEN GAS.

Brooklyn, N. Y., apparently holds the season's record for placing Summer cars in service in this latitude. On Sunday, March 21, both the Brooklyn Heights and the Nassau companies put open cars in commission during the middle of the day. They were splendidly patronized.

PERSONAL.

Mr. A. C. Bunce, Milwaukee manager for Donley & Bunce, Chicago, reports business in the northwest as slowly but surely increasing.

Mr. Eugene H. Lewis, a prominent patent attorney of New York city, and Miss Amy Busby, the well known actress, were married at Rochester, N. Y., on March 19.

Col. Gardiner C. Sims, of the Armington & Sims Engine Company, Providence, R. I., has been for some days at Lakewood, N. J., recuperating from an illness serious enough to compel him to withdraw from business cares for a time.

Prof. F. B. Badt, of Chicago, secretary of the Siemens & Halske Electric Company of America, has the sympathy of his many friends on the recent death of his mother in Germany. Professor Badt's mother was 72 years of age, and her death was caused by pneumonia following an attack of the grippe.

Mr. Abner McKinley, brother of the President, is largely interested in the electrical business, being a stockholder in McGuire & Baucus, Limited, of New York and London, the foreign representatives of Mr. Edison and the manufacturers of MB copper. Mr. McGuire, of this concern, was also formerly the private secretary of President McKinley.

The numerous friends of Mr. Wm. E. Smith, formerly with the National Electric Company, Eau Claire, Wis., will be glad to hear of that gentleman's rapid rise and success in his new field of work, at Cairo, Ill., where he has just been promoted to the position of manager of the Three-State Lumber Company, one of the biggest concerns in that city. While with the National Electric Company, Mr. Smith became universally esteemed for his many sterling qualities, and it is to be regretted that he is no longer actively engaged in the electrical business.

American Bell Telephone Company.

The directors of the American Bell Telephone Company, at Boston, on March 17 voted to submit to the annual meeting of stockholders the question of sanctioning a further issue of stock at an upset price to be named by the Commissioner of Corporations, as heretofore. The present outstanding capital is $23,650,000. The amount authorized is $50,000,000. The regular quarterly dividend of $3 per share was declared, payable April 15 to stockholders of record March 31.

American Institute of Electrical Engineers.

The 114th meeting of the Institute will be held at 12 West Thirty-first street, New York city, on Wednesday, March 24, 1897, at eight o'clock P. M. A paper by Dr. Karl E. Guthe will be read by Prof. Henry S. Carhart, of the University of Michigan, entitled, "The Influence of Heat Treatment upon the Magnetic Properties of Hardened Steel."

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ILLUSTRATED
ELECTRICAL REVIEW
A Journal of Scientific and Electrical Progress.

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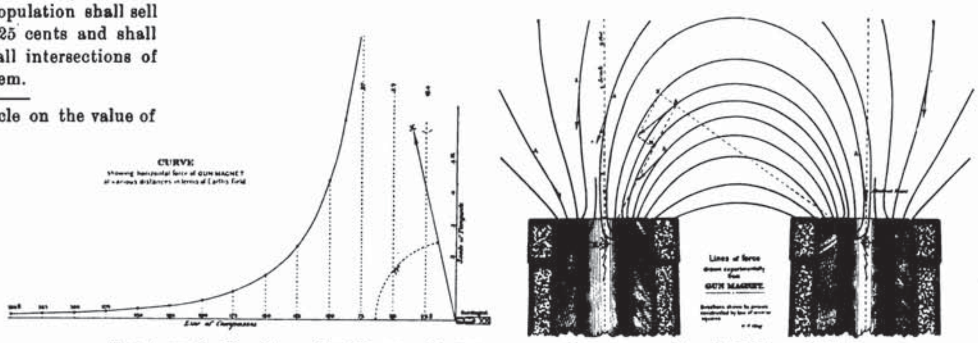
VIEWS, NEWS AND INTERVIEWS.

The Electric Springs Railway, of Warrensburg, Mo., the only important street railway system of that city, has been sold for scrap iron. The rolling stock and other property connected with the system were also disposed of at a great loss.

The fight for cheaper fares on street-railway lines has been removed from Chicago, Ill., to Springfield. Representative Nohe, of this city, has introduced a bill in the legislature which provides that all surface and elevated street railways in cities of over 200,000 population shall sell seven tickets for 25 cents and shall give transfers at all intersections of lines owned by them.

The recent article on the value of incandescent lamp filaments that appeared in the Electrical Review is still attracting attention from the lamp manufacturers and lamp users. Some of them apparently had never appreciated this minute treasure. Refinement of this slender and as yet vital factor in lamp construction is the constant aim of the producers of incandescent lamps.



Figs. 1 and 2.—The Great Gun Magnet.—Illustrated and Described by Col. W. R. King, U. S. A.

The earnings of the Central Union Telephone and Chicago Telephone companies, licensees of the American Bell Telephone Company, operating in Illinois, Indiana and Ohio, are compared below:

	Central Union, 1896.	Chicago, 1896.
Capital stock	$6,606,300	$4,336,500
Bonds	1,600,000	......
Gross earnings	1,327,931	1,955,829
Net	301,620	600,204
Interest	64,521	......
Dividends	66,053	499,224
Surplus	171,046	100,980
Earned on stock	3.5	13.84

In the case of the Chicago Telephone Company, net earnings were the largest in the history of the company, showing a gain of $75,365, but in the case of the Central Union the effect of competition has been apparent, net earnings falling off nearly $125,000.

A Proposed Experiment to Demonstrate that X Rays Are Material.

In line with the theories advanced by Tesla, that Roentgen rays are particles of matter, Mr. T. B. Kinraid, whose researches and experiments relative to fluorescent salts have been of general interest to the scientific world, outlines a proposed test by which he demonstrates Tesla's theory. In an interview with a representative of this journal, Mr. Kinraid said: "I want to take several methods, when I can make sure that I have the necessary time, to develop the following experiments, which I believe will show conclusively the nature of the unknown rays."

The test as outlined by Mr. Kinraid is substantially as follows: Two metal disks, one and one-half inch in diameter, are to be made of a metal that is sonorous, but has the power to intercept the X rays. These disks are to be accurately and perfectly gauged, so that there shall be no chance for variation in their condition during the life of the experiment by being subjected to a long period of graduation. Each of these disks is to be supported on its center by a small stem which will permit it to have perfectly free vibration, and mounted on these disks are to be very delicate hammers, so that these hammers may start the vibration of the disks. The resonators are then to be connected by a tube, and from that tube a second tube will be connected, so that it can be taken to the ear. A difference in the vibration frequency must be arranged for, so that that difference can be reckoned per second. One of the disks and its resonator will be inclosed in a thick metallic case, not allowing any of the rays to pass through, and the other disk to be subjected to the vocalized energy of a powerful Crookes tube, so as to concentrate on it all the energy possible.

Mr. Kinraid believes that if the X rays have any of the qualities of matter as we know it, it will produce a certain pheonomena in the metallic plate, and if it is physical matter it will increase the vibration of the disk exposed to the rays and also the frequency of the other disk. This variation will be instantly detected by the ear at the tube, and the variation of the frequency of the two disks may be recorded.

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Not the Ottawa, Ontario, Electric Railway.

Relative to a note published in this journal as to the reorganization of the Ottawa Electric Railway, we have the following from Messrs. Ahearn & Soper, contracting electrical engineers, of Ottawa, Ontario:

"We presume that this refers to some town called Ottawa in the western States, as there are several places of this name. We shall be pleased if you will make the necessary correction, as the Ottawa, Can., Electric Railway Company is not the road in question."

The Ottawa referred to is in Illinois.

THE GREAT GUN MAGNET.

SOME MEASUREMENTS OF THE MAGNETIC STRENGTH MADE BY COLONEL KING, LIEUTENANT-COLONEL ENGINEERS, U. S. A.

To the Editor of Electrical Review:

Referring to the article on my "Gun Magnet," in your issue of February 27, 1895, and the remark therein that some further experiments might be made, I now take pleasure in forwarding the following brief account of some measurements of the strength of the magnetic field at different distances from the magnet. These experiments were made in June, 1895, but the results have not been worked up until quite recently.

For the purposes of these tests the electro-magnet—which, it will be remembered, was made by wrapping about 10 miles of insulated wire around a 15-inch cast-iron cannon weighing 50,0(0 pounds—was placed as nearly east and west as practicable, and small compasses with about two and one-half-inch needles were located at intervals of 25 feet in the prolongation of its axis, as shown in Fig. 1. Owing to unavoidable obstructions, the line of compasses made an angle of 77 degrees with the magnetic meridian instead of 90 degrees, and the necessary correction was made in the formulas.

After the compasses had all been set as nearly as possible with zeros in the magnetic meridian, the current was turned on the magnet and gradually increased to a maximum steady current of about 25.8 amperes, when all of the compasses were read simultaneously. The current was then reversed, and the readings were again taken; these operations being repeated several hours later, so as to get reliable mean readings.

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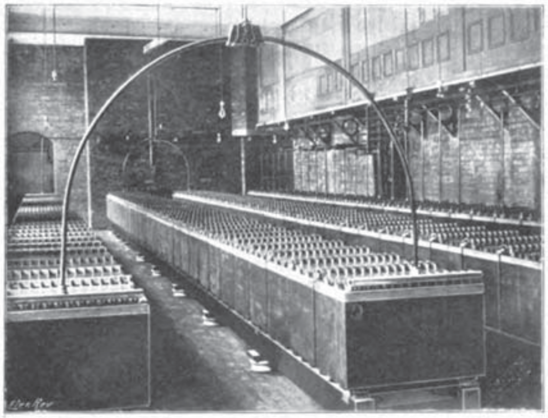
For milking purposes, there is a small motor-generator also supplied by Messrs. Bruce Peebles & Co., located in a small brick compartment within the battery room, which connects with two pairs of trolley wires run above the central gangways between the rows of the cells, to which the milking leads can be connected. Above the battery room is situated a machine shop, containing a 12-in. lathe with bed long enough to take the longest shaft, and gap deep enough to take the largest cylinder. This is motor driven, the motor being contained in a casing under the head-stock. There are also a brass-finisher's lathe, shaping machine, radial drilling machine and a tool grinder; these were supplied by Mr. Thos. Lumsden, of Gateshead-on-Tyne. Adjoining this in a fire-proof room is the joiners' shop, which contains a band saw, circular saw and grindstone; these were also supplied by Mr. T. Lumsden, and are driven by "Lundell" motors.


Battery Room.

There is an engineers' mess-room overlooking the engine room, underneath which is situated a spare gear room, on the walls of which will be hung the necessary spare gear.

A large development is taking place in the borough among the ship-yards, which are gradually throwing out their obsolete plant, and using electrical power. A supply of energy is required at some distant points, and it has become necessary to make immediate arrangements for the installation of high-pressure transmission plant. Sub-stations will be erected in the first instance at the South Docks, and at Monkwearmouth; each sub-station being about 2 miles from the central station. These sub-stations will contain three-phase motor-generators, the motors being run off a 5,500-volt circuit, at 50 periods per second, and the generators being direct-current, 220-volt, delivering into the low-pressure network. The cables will, of course, be three-core, drawn into Doulton casings, laid in concrete. At the station it is proposed to remove Nos. 4 and 5 dynamos, and couple them to motors at the sub-stations, and in their place to instal three-phase alternators, and to add two 750-kw. machines. These will generate at 5,500 volts, 50 periods per second, and will be star-wound with the centre point earthed. It is intended eventually that the pioneer station shall be converted into a sub-station, the machines to be driven from the main station at Hylton Road.

The building designs were prepared by Mr. John W. Lincoln, the chief draughtsman, now on the staff of the British Electric Traction Company, Limited, in conjunction with Mr. Snell; and the supervision of the building and installation was performed by Messrs. R. J. F. Carter and Edward White, the clerk of works and station superintendent engineer, respectively, under the borough electrical engineer.

The new installation was entirely designed and carried out by Mr. J. F. C. Snell, borough electrical and tramways engineer, to whom we are indebted for the particulars and photographs of which this article is composed.

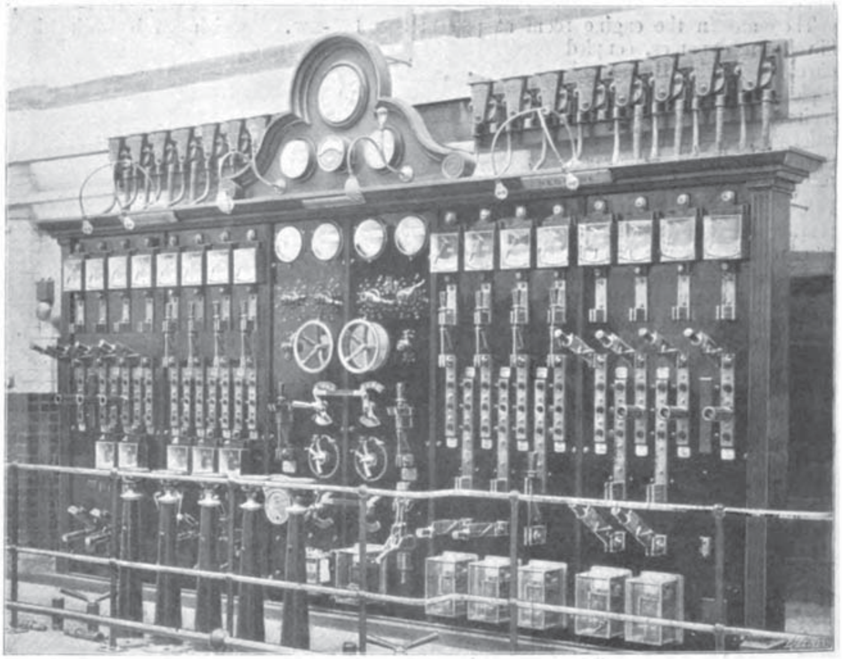
The ground was first cut in March, 1901, and the supply was first given on October 31st, 1901, in time for last winter's load.

THE KINRAIDE COIL.

Two of the weakest points in the ordinary induction coil are the insulation between the ends of the secondary coil and the ends of the primary coil. With long spark coils, a half inch of vulcanite is often pierced at these points. A coil designed to get over this source of weakness is described by Mr. T. B. Kinraide in the *Electro-Therapeutist*, Ohio, U.S.A. The improved arrangement, in general terms, consists in dividing the primary and secondary coils into two halves, and placing the primary coil outside the secondary.

Fig. 1 shows diagrammatically the arrangement of the two primary and the two secondary coils placed side by side. The secondary coils A A are wound in flat spiral form with their high pressure + and − terminals at the centres. The primary coils B being outside the secondary coils, are thus removed as far as possible from the secondary terminals where there is the greatest potential difference. The two secondaries and the two primaries are connected at their peripheries as shown in fig. 1.

The primary is operated by a form of spark-gap, the efficiency of which is due to a low-pressure current discharging across a very small air space, and producing erosion of copper plates which interrupt the circuit in the primary. A condenser is charged to about 900 volts, and is discharged


Sunderland: Main Switchboard.

through both primary circuits in parallel, producing a great many interruptions per second in the circuit of the induction coil proper. In the device used for charging the condenser, there is a rotary break in the circuit, with a coil connected with the street main. At each interruption of the latter coil, the induced current charges the condenser, and with each charge there is a breakdown of the air-gap. This air-gap is regulated at will by means of a lever. The rotary break makes about 2,400 interruptions per minute, and with each of these interruptions there are about 20 to 25 interruptions in the primary circuits of the induction coils, thus giving about 48,000 interruptions per minute. There is no heating in the large copper wire forming the primary. The secondary is embedded in a solid insulation of resin and beeswax. All the parts of the coil are easily accessible for repairs.

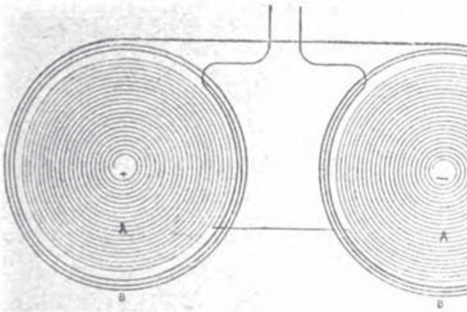


Fig. 1.

The complete coil is shown in fig. 2. There is apparently no iron core used in connection with the primary, and it would probably add little to the effect with the rapid oscillations produced by the discharge of a condenser. The discharge from the secondary can be varied very considerably by moving the spark-gap plates to a greater or less distance from each other. When these plates are farther apart, the frequency of the condenser discharges increases, and a painless discharge is obtained from the secondary. The best results in X ray work are obtained when the plates are rather close together.

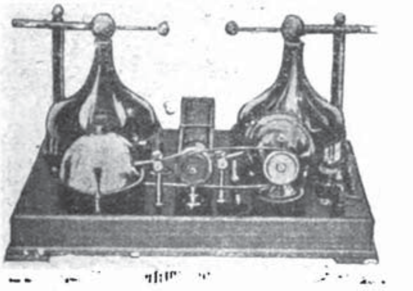


Fig. 2.

This coil reminds us of some of Tesla's induction apparatus, and it seems to produce much the same kind of discharge as the Tesla coils. There appear, however, to be several novel and good points in Mr. Kinraide's design.

BUSINESS NOTES.

(*Continued from page* 386.)

Trade Announcements.—Owing to the death of Mr. J. W. Daniels, the business of Messrs. Thackrah & Son, electrical engineers, of Crown Street, Halifax, has been converted into a limited liability concern, with Mr. York, late of Bradford, as managing director.

Mr. Henry Ingram, formerly a member of the firm of Messrs. H. Ingram, Limited, electrical engineers, of Warrington, has commenced business on his own account as an electrical engineer at 44, Parker Street, Warrington.

Minnie Crowther announces that she has acquired the sole right and title to use the name of Crowther & Co, electrical engineers, Manchester, from Mr. E. P. Crowther, and that she will carry on business in the City as an electrical engineering contractor.

Owing to increase of business, the South-Western Electrical Contracting and Maintenance Company are removing to larger premises at 2, Fulham Palace Road (adjoining their present address), and have taken into partnership Mr. John Carnaby, of Broad Street, W.C.

In consequence of increasing business, Messrs. Baxter & Caunter have secured larger and more convenient premises at 86, Charing Cross Road, where they will carry on their agency business and carry and show the goods of the various manufacturers they represent.

Mr. Robert Stevenson has just commenced business on his own account as the Empire Belting Company, at 7, Brazenose Street, Manchester. He has been connected for the past 16 years, with the Gandy Belt Manufacturing Company, during which period he has obtained very wide experience as to the difficulties connected with belt-driven motions, and the most effective arrangements for overcoming them. As the Empire Company, Mr. Stevenson will make a speciality of cotton, woven hair, leather, gutta-percha, canvas, leather link, and other beltings, and accessories therefor.

Messrs. James Willats & Son, gas and electrical engineers, of 19, Gray's Inn Road, W.C., notify that, in consequence of the large increase in their business, they have taken additional premises; they are opening new showrooms at No. 29, Gillingham Street, Belgravia, S.W., with a well assorted stock of electrical and gas light fittings.

Mr. F. Winter notifies that Dr. Heinrich Traun, trading as the Harburg India-Rubber Comb Company (Harburger Gummi-Kamm Co.), Hamburg and Harburg, o./E., has taken his sons, Mr. Heinrich Otto Traun, and Dr. Frederick Adolph Traun, into partnership. The business will be carried on exactly as before, but under the changed style of firm:—Vulcanite Works, Dr. Heinr. Traun and Sons (formerly Harburg India-Rubber Comb Company). All British communications are to be addressed to Mr. Winter as heretofore.

ELECTRIC LIGHT AND POWER NOTES.

Aberdeen.—The electric lighting accounts for the year ending July 31st show a total income of £23,139 18s. 5d. and an expenditure of £10,499 10s., leaving a balance to be carried to net revenue account of £12,139 8s. 5d. Out of this has to be met interest on mortgages and other loans, £4,767 2s; depreciation on buildings and plant, £3,226; and sinking fund, £2,290; leaving a surplus of £2,699 to be carried to reserve fund, which now stands at £7,664. The sinking fund stands at £9,182. The extent to which borrowing powers have been exercised on mortgage is £173,572 7s. 6d., leaving a balance of £11,427 12s. 6d., representing a total of £185,000. The amount expended on the Cotton Street works, less depreciation, is £97,368 4s. 2d., and on Ferryhill works £69,804 13s. The quantity of electricity generated was 1,859,812 units, as compared with 1,389,395 in the previous year. The quantity consumed was—Public lamps, 186,058; traction, 381,495; and private consumers, 979,016, compared with 793,176 last year, the total sold being 1,546,569. The quantity used in the works was 91,901, and the total accounted for was 1,638,470. The quantity not accounted for was 221,342.

Airdrie (N.B.).—The streets were lit with electric light for the first time on the 1st inst. The installation at present consists of 10 arc lamps and over 100 incandescent glow lamps. Current is obtained from the Scottish House-to-House Electricity Company, Limited, whose works are in the adjacent burgh of Coatbridge.

Barnsley.—At a meeting of the T.C. last week, it was decided to apply for a loan of £4,500 for electricity purposes, in view of the probable requirements for the Barnsley and District Light Railway and other customers.

Barnstaple.—The T.C. has decided to have the whole of the Corporation buildings and offices wired ready for current. Mr. W. H. Trentham, consulting engineer, has informed the Corporation that the works and the installation in the compulsory area will be completed by Christmas.

Bridlington.—The Town Council has decided to apply to the L.G.B. for a loan of £25,000 for the purpose of carrying out the electric lighting order.

Bromley (Kent).—The R.D.C. has decided not to oppose a private company's application for a prov. order to supply the district. The B. of T., however, is to be asked to insert a clause giving the Council the option of purchase within 7, 14, or 21 years.

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X-Ray
and High
Frequency
COILS

Swett & Lewis
Company
14 BOYLSTON STREET
BOSTON, MASS

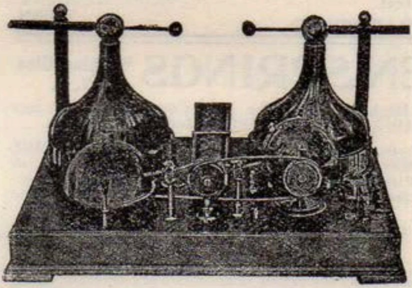
X-RAY APPARATUS.

THE KINRAIDE COIL

Is excellent for treating cancer and all diseases of the skin.

ITS STRONG POINTS:

Ease of regulation,
Cannot be broken down,
Run on any commercial electric circuit,
Always ready to work.



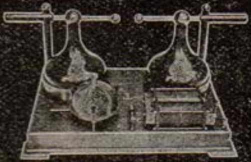
Write for Catalogue.

SWETT & LEWIS CO.

79D Franklin St., Boston.

Makers of Crooks Tubes, Static Machines, X-Ray Outfits, and all kinds of Electro-Therapeutical Apparatus.

Kinraide Coils



FOR X-RAY-
HIGH FREQUENCY-
ULTRA VIOLET WORK

Short Exposure — Immense Output — Steadiness of Ray — No Breakdown — Unaffected by Weather — Easily Carried — Connects to Any Electric Lamp Socket

Prices Greatly Reduced

Send for Catalogue No. 4

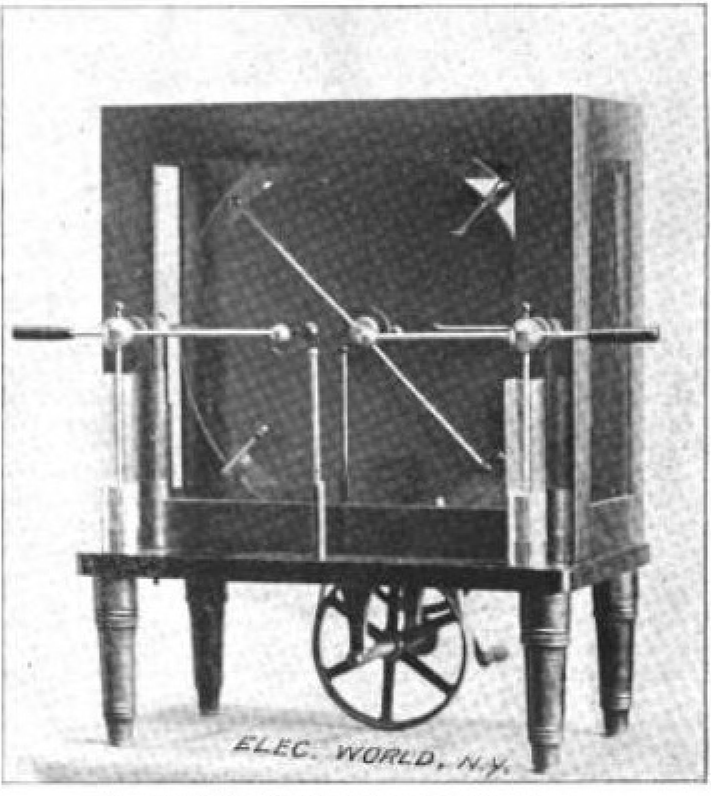
SWETT & LEWIS COMPANY
18 Boylston Street, Boston, Mass.

A New Röntgen Ray Outfit.

The Swett & Lewis Company, successor to G. A. Frei & Co., Boston, Mass., furnishes a very efficient X-ray outfit, consisting of a static machine, a focus tube and a fluoroscope. We illustrate herewith the static machine, which has recently been improved in many respects. It has four plates, two of glass and two of rubber. The latter are mounted on ball bearings and can be driven by hand at a speed of 1800 revolutions per minute. The device is enclosed in a very neat and substantial moisture-proof mahogany case, having glass sides to permit a thorough inspection.

The company also builds another style, similar in design to the above, but arranged to be driven by a motor located in the base.

The X-ray tubes manufactured by the Swett & Lewis Company are especially made of imported glass, entirely free from lead or other impurities, and give a very fine definition. One notable type of very high power has recently been designed for the company by a well-known Boston physician, and is intended for use on eight-plate Wimshurst machines and induction coils. It has met with unqualified success among the hospitals and medical fraternity.



Static Machine for Röntgen Ray Work.

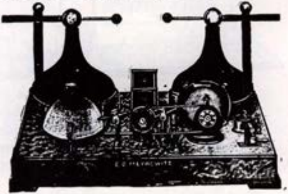
The latest novelty is an adjustable spark gap. It is easily fitted to any style of static machine and improves the definition very materially.

The Kinraide High-Frequency Coil.

The best apparatus for use with the direct or alternating current.

* * *

SEND FOR DESCRIPTIVE CIRCULAR.



E. B. Meyrowitz,

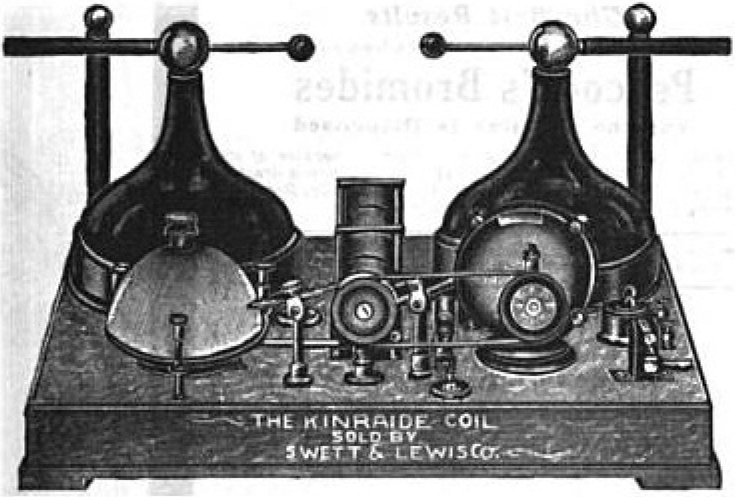
Maker of Ophthalmological Apparatus, Complete Standard Electro-Therapeutic Equipments, X-Ray Apparatus and High Grade Eye, Ear, Nose and Throat Instruments.

104 East Twenty-third Street,
125 West Forty-second Street,
650 Madison Avenue,
NEW YORK.

604 Nicollet Avenue, Minneapolis,
360 St. Peter Street, St. Paul,
3 rue Scribe, Paris, France.

1899

THE KINRAIDE COIL


THE KINRAIDE COIL
SOLD BY
SWETT & LEWIS CO.

Unexcelled for X-Ray High Frequency and Ultra-Violet Work

**PRICES
GREATLY REDUCED**

Coil cannot be broken down; works in all climates; readily portable; can be attached to any lamp socket.

Send for bulletin on Coils and X-Ray Tubes.

SWETT & LEWIS CO.,

Dept. No. 1.

18 Boylston Street, Boston, Mass.

Six years ago the X-ray apparatus was universally regarded with suspicion. To-day nearly every up-to-date physician has a Kinraide Coil, which he instantly attaches to an ordinary incandescent-light socket and conducts a thorough X-ray examination or treatment, neatly, quickly and almost without expense.

The famous Kinraide is the sole product of Swett & Lewis, of Boston, Mass., who first started business in 1897 with two men in a 10x12 foot floor space. The tremendous demand for their product has continued to increase with such rapidity that they have found it necessary to double, and even treble their capacity many times.

NEW ENGLAND NOTES.

Branch Office of The Electrical World,
Room 91, Hathaway Building, 620 Atlantic Ave.,
Boston, Mass., March 31, 1897.

MESSRS. E. S. RITCHIE & SONS, Brookline, manufacturers of philosophical apparatus and marine compasses, have just completed thirty binnacles to be used on board the new United States cruisers. They are also doing a good business in induction coils for Rontgen ray work.

RONTGEN-RAY SUPPLIES.—Within the past few months there has been a great demand for Rontgen-ray apparatus, especially by surgeons and scientists. The Spring Park Laboratory, Jamaica Plain, Mass., has been kept very busy supplying them with fluorescent screens and salts.

ELECTRIC POTENTIAL.—This organization will hold its annual meeting at Young's Hotel, Boston, next Wednesday evening, April 7. Dinner will be served at 6.30 sharp. Following the dinner the election of officers will occur, after which the important and interesting topic of the evening, "Electricity at Niagara Falls," will be presented by Mr. C. F. Scott, of the Westinghouse Electric & Manufacturing Company illustrated by the stereopticon views and models.

THE L. E. KNOTT APPARATUS COMPANY, 14 Ashburton Place, Boston, has been manufacturing a very neat static machine which is mounted in a moisture-proof case and is to be run by either an induction or direct-current motor. The company has also designed a Rontgen ray set which is remarkably neat and compact, consisting of an induction coil, a Tesla high frequency coil, an old condenser, and break wheel. The break wheel is one of the company's own design and gives a very uniform spark.

appears continuous. The above experimental results, especially with the laminated ring, will no doubt be of interest in connection with the peculiar phenomena met with in working with transformers.

The writer is indebted for suggestions to Prof. F. B. Crocker, Dr. M. I. Pupin, and to Mr. W. H. Freedman, of Columbia College.

Tesla Currents with Simple Apparatus.

Mr. F. Himstedt publishes in Wiedemann's Annalen, vol. 52, page 473, some interesting researches with Tesla currents, produced by means of rather simple apparatus. We give below a translation of an abstract of this paper as published in the Elektrotechnische Zeitschrift, July 12.

The reason why the researches of Tesla have not been reproduced in Germany is probably due to the fact that the apparatus which he used was not at hand. It is very interesting to note that the author succeeded in reproducing most of the results with exceedingly simple apparatus. He at first used Lecher's arrangement for the production of Hertzian waves, but afterward used still better known apparatus, namely, Leyden jars.

He connected the pole of a powerful Ruhmkorff coil (50 cm. long and 20 cm. diameter, using from 5 to 6 accumulators) with the inner coatings of two moderately large Leyden jars, insulated from each other by being placed on paraffine; he also used a spark micrometer. The outer coatings of the jars were connected with a 4 mm. wire, 150 cm. long and bent in the shape of a U. A 16-volt incandescent lamp connected in parallel to this wire was brought to a white heat by proper adjustment of the micrometer. By using

minated at distances of from three to four metres from this sphere.

An incandescent lamp connected with the pole which is not connected to earth shows only the pale light of a Geissler tube. But if a large metallic disc is connected to the glass bulb, the lamp will glow brightly. The filament will, in that case, oscillate so that it soon breaks. If a conductor be approached to the point of the lamp this point will be immediately pierced by the current and a continual bright stream of sparks will pass through the opening, and the filament will at once begin to glow until it is consumed.

In the second part of his paper the author states that a Tesla coil is quite different in its actions from an ordinary induction coil. A Geissler tube connected in any way with the pole of a Tesla coil shows cathode light at both electrodes, an anode light in the middle. A commutation of the primary current or a reversal of the pole has no effect. An electroscope is always charged positively when it is approached with a pole terminating in a point. Both poles produce only positive Lichtenberg figures, never negative.

Researches with different gases show that this preponderance of the positive discharges from the pole of a Tesla coil depends on the surrounding medium. Air or oxygen promote positive discharges; hydrogen, illuminating gas, nitrogen, carbonic acid gas and ammonia, promote negative discharges.

If two points are connected with one pole, one in air and the other in hydrogen, positive and negative electricity will be discharged simultaneously from the same pole, depending on the surrounding gas. If one of the points is in oxygen, and if gradually more and more nitrogen is added, an electroscope opposite the point will at first show a moderate positive charge; with increasing quantities of nitrogen this will increase; when the mixture corresponds to that of air the positive charge will reach a maximum; if the nitrogen is

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in excess the charge will be reversed and will become negative. The process is similar if it is begun with nitrogen and the oxygen gradually added. With an ordinary induction coil the charge of an electroscope will be reversed when the primary current is reversed.

Figs. 31 and 32 are the respective positive and negative taken in the case of a horse-shoe magnet. Here outside the magnet the filings are absent in a region in the neighborhood of the poles NS. The cause of this is as follows: The fields were obtained by sprinkling iron filings over a smooth glass surface; the tapping of the sur-entire electrical work is under the supervision of Mr. Charles Cuttriss, electrician of the Commercial Cable Company, and Mr. Francis W. Jones, electrician of the Postal Telegraph-Cable Company.

PHILADELPHIA NOTES.

Branch Office of The Electrical World,
927 Chestnut Street,
Philadelphia, Pa., Feb. 15, 1897.

THE PHOSPHOR BRONZE SMELTING COMPANY, LTD., describes its well-known Delta metal in a little pamphlet just issued. Delta metal is not offered as a substitute for the well-known "Elephant Brand Phosphor Bronze," but occupies a distinct field of its own.

LARGE CONTRACT. FOR ARMORITE TUBING.—We are informed

is used. Two electric stoves, with a stew pan and coffee pot, will, it is claimed, enable a family to cook a breakfast of coffee, toast and eggs in the time required to build a fire and get the ordinary stove ready.

THE SWETT & LEWIS COMPANY, Boston, manufacturers of Rontgen-ray apparatus, photographic and electrical supplies, has removed from 17 to 11 Bromfield Street. The new quarters are spacious and well adapted for the continued increasing business of the company. Succeeding, as it did recently, to the firm of G. A. Frei & Co., which had gained a creditable foothold in Rontgen-ray work, the Swett & Lewis Company has increased in credit and favor. It is constantly seeking to improve upon Rontgen-ray apparatus and devices, and will very soon introduce to the trade some novel and important specialties, among which will be new tubes and fluoroscopes. The company is receiving some flattering testimonials as to the quick and perfect working of its various Rontgen-ray specialties.

NOTICE.

We be leave to announce that we have purchased the business and good will of the American Roentgen Ray Co. of Bedford street, this city, and have removed the same to 11 Bromfield street.

We hope that you will continue to favor us with your patronage, which will receive prompt attention.

We are prepared to furnish, immediately, anything in the line of Static machines, parts and supplies, X-ray tubes, fluoroscopes, spark-gaps, tube-stands, etc. Also everything in the line of Electro-medical apparatus.

Our new Barium fluroscopes are very brilliant and will last indefinitely.

Special static tubes price $5.00 and $6.75, also type M. for the largest machines, price $8.00. These tubes are superior to any on the market for brilliancy, penetration and life.

Thanking you for past favors, we are, very truly yours,

SWETT & LEWIS CO., Boston, Mass.
Successors to American Roentgen Ray Co.

the service to the switchboard required about fifteen men.

NEW ENGLAND NOTES.

Branch Office of THE ELECTRICAL WORLD,
Room 91, Hathaway Building, 620 Atlantic Ave.,
BOSTON, Mass., May 24, 1897.

NEW KNIFE SWITCH.—The Hope Electric Appliance Company, Providence, R. I., has just issued a very neat and artistic circular containing an illustration and description of its new instantaneous make-and-break safety knife switch.

RÖNTGEN RAY SPECIALTIES.—The Swett & Lewis Company, successor to G. A. Frei & Co., Boston, has made some very gratifying sales of X-ray outfits. Arrangements have been just completed whereby one of the large photographic supply houses, and also a leading surgical instrument dealer, both of New York, will handle the company's X-ray specialties.

IN LARGER QUARTERS.—The Ansonia Electrical Company, Ansonia, Conn., since the addition to its factory, is certainly housed most comfortably, thence westerly under Forty-second Street to Broadway and thence northerly under Broadway and the Boulevard to 104th Street. At 104th Street the road will be divided into two two-track branches, the western branch, going under the Boulevard to Kingsbridge; the easterly branch, starting from 104th Street, will run under private property to Lenox Avenue and 116th Street, thence northerly under Lenox Avenue to the north side of the Harlem River and thence to Bronx Park. It is proposed to cross the Harlem River in a tunnel near the end of the Lenox Avenue branch and by a bridge at Kingsbridge. It is estimated that these lines could be constructed for about $35,000,000.

BUFFALO AND NIAGARA FALLS NOTES.

BUFFALO, N. Y., Jan. 6, 1897.

CANADIAN NIAGARA POWER TUNNEL.—The important statement is made that the franchise of the Niagara Falls Power Company, for the building of the Canadian power tunnel across the river, has been extended for four years. Chief Engineer Breckenridge said he understood that the extension will be made, if it is not already made.

TESLA'S LECTURE IN BUFFALO.—An effort is being made by the Buffalo Society of Natural Sciences to secure Nikola Tesla for a lecture to be given shortly in this city. Mr. Tesla will be present at the electric banquet on Jan. 12, and it is hoped that he may speak in public while in the city. The invitation extended to him is signed by many distinguished citizens, among them Mayor Jewett, Dr. Roswell Park, Dr. Park Lewis and Mr. E. B. Guthrie.

EXTENSION OF NIAGARA FALLS & SUSPENSION BRIDGE LINE.—The Niagara Falls & Suspension Bridge Street Railway Company expects to start in the Spring to extend its newly acquired Devil's Hole line from its

and Mr. Field will be located at 65 Federal Street, Boston.

THE SWETT & LEWIS COMPANY has succeeded G. A. Frei & Co., Boston, manufacturer of Röntgen-ray supplies, and will continue the business for the present at the same address, 17 Bromfield Street. Mr. Frei retires to engage in other branches of the electrical business. Mr. Frank H. Swett, of the company, has been connected with the T. H. and General Electric Companies, and he has also held other important electrical connections; Mr. Lewis is new to the electrical field, but possesses good business qualifications, and Mr. Albert W. Rantoul, who will be connected with them, has had an active electrical experience, all of which ensures success for the new company.

HUNTRESS & EWING is the style of a new firm introduced with the new year. Its business is that of electric railway equipments of all kinds and motors and dynamos, new and second hand. The business address of the firm is 8 Oliver Street, Boston. Both Mr. Huntress and Mr. Ewing are widely and favorably known in the electrical field, and have for quite a time been interested together in the Neal Electric Headlight Company, as officials, and the closer business relations now established will undoubtedly result in greater mutual advantages, while the concentration of their energies should also prove of advantage to the electrical field in the way of better service.

THE PETTINGELL-ANDREWS COMPANY, Boston, is sending to its customers, friends and the electrical trade generally a most beautiful 1897 calendar, the handsome engraving upon which is really an artistic gem. Its conspicuous feature is the goddess of electricity standing in the centre of the globe collecting electricity from the clouds and distributing it around the world, a complete circuit being made between the Eastern and Western hemispheres represented respectively by the palm and pine trees as terminals. An arc lamp is held in the right hand of the goddess, old Ocean is the foreground and frequent

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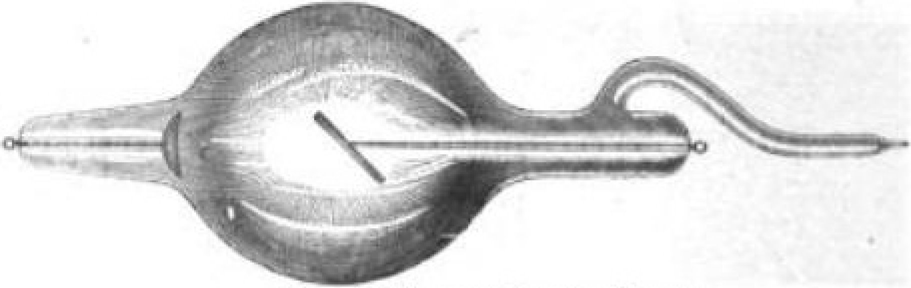
lamp only measures 24 inches.

A Large Size Crookes Tube.

We illustrate herewith a large size Crookes tube, manufactured by the Swett & Lewis Company, successor to G. A. Frei & Co., Boston, Mass.



Crookes Tube of Special Design.

The tube has been specially designed by a leading physician for use on large static machines and induction coils, and will easily cover a 16-inch x 20-inch plate. The electrodes are so placed as to get the full benefit of the rays. When desired the terminals can be furnished with metal caps to protect the wires. Many hospitals are availing themselves of this large tube, which, when used in connection with the company's new adjustable spark-cap, will give at least 25 per cent. increased brilliancy. Besides giving a greater volume of light the large tubes do not run up in vacuum, as do the small ones, and will last longer.

NEW ENGLAND NOTES.

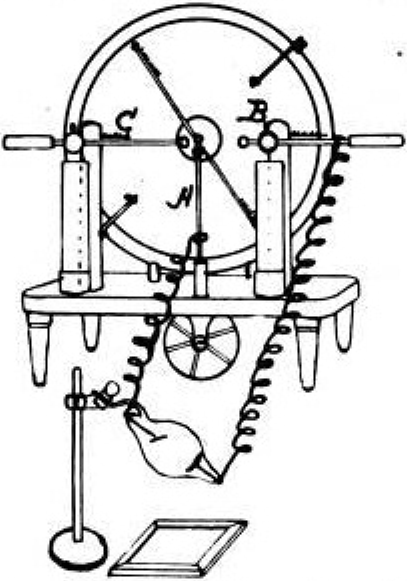
Branch Office of THE ELECTRICAL WORLD,
Room 91, Hathaway Building, 620 Atlantic Ave.,
BOSTON, Mass., April 2, 1898.

THE C & C ELECTRIC COMPANY'S Boston office has been removed from 63 Oliver Street to more modern and commodious quarters at 19 High Street, corner of Federal. The company's customers will be welcomed at the new offices by Mr. William F. Palmer, who has recently succeeded Mr. H. A. Howard as the New England manager.

THE SWETT & LEWIS COMPANY, Boston, has purchased of the Stanley Dry Plate Company, Newton, Mass., its static machine parts and supplies, which makes a most valuable acquisition to the already admittedly efficient lines of X-ray specialties of the Swett & Lewis Company, the business of which has grown to quite a large magnitude. The Swett & Lewis Company is just issuing new catalogues on static machines, Crookes tubes and fluoroscopes, copies of which will be gladly furnished upon application.

Static Machine and X-Rays.

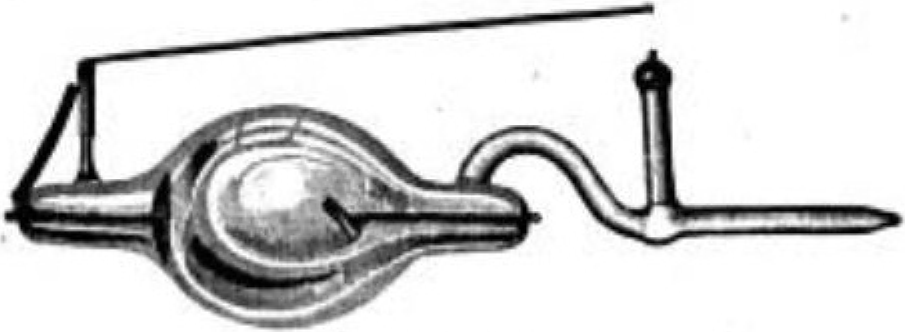
The School Journal of Nov. 6, 1897, published a cut and description of Stanley's Toepler-Holtz machine, especially designed for x-ray work, and manufactured by Swett & Lewis Co., 11 Bromfield street, Boston, Mass. The ordinary static machine in use in many schools may be used for x-rays by the addition of a small Crookes tube. Observe the following directions: Attach the tube to a support. Connect the concave terminal (cathode) of the tube to the negative rod of the machine. (The negative side shows a blue flame on the collecting combs.) Connect the slanting disk (anode) of the tube with the upright spark gap post. If this is not on the machine, it can be easily erected, midway between the other two posts, with its ball just a little below their top. Then have the positive pole about three-fourths of an inch from the ball of the erect post. Start the machine, let the spark jump at first between the regular positive and negative poles, then pull the negative pole away four or five inches, and the current will pass through the tube. The current can be regulated by changing the position of the positive ball. The tube should show a high fluorescence between the terminals and a dark band behind the anode. Place a photographic plate under the tube, and a radiograph may be taken.



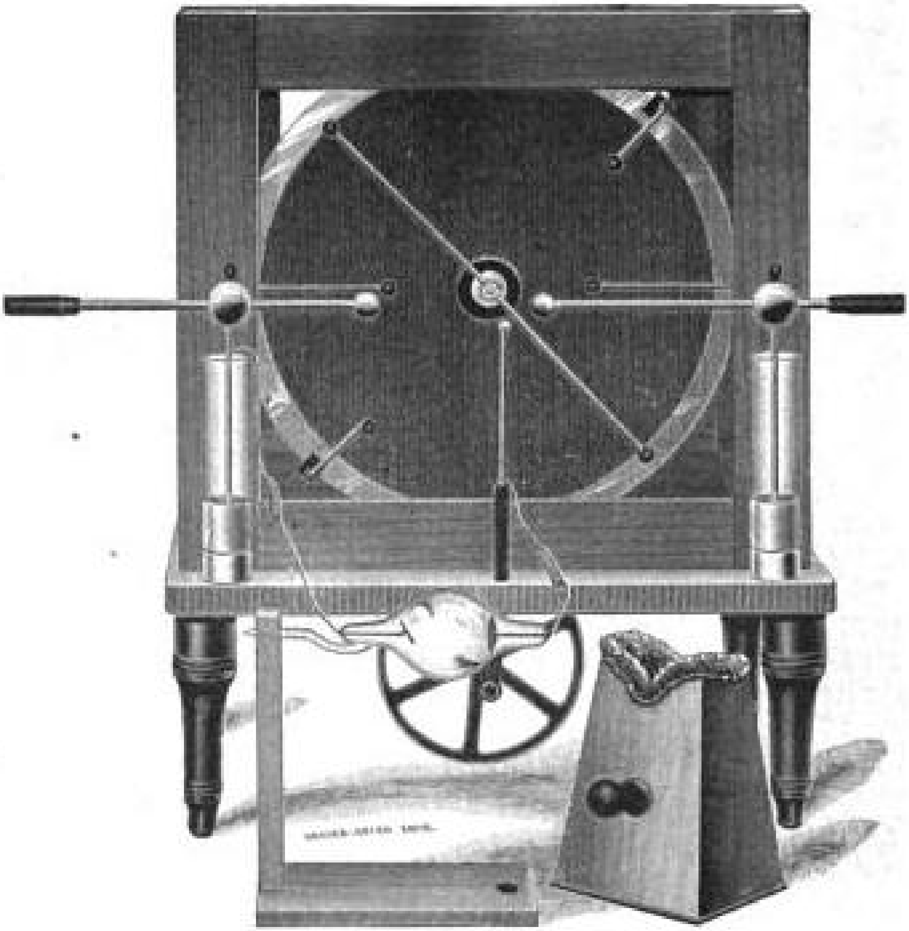
To observe with the fluoroscope, the anode should be turned toward the observer and the object to be examined placed against the bottom of the fluoroscope, which should be held close to the tube.

Adjustable Vacuum Tube.

The Swett & Lewis Company, of Boston, the well-known manufacturer of X-ray and photographic supplies, has just put upon the market a new adjustable vacuum tube which is attracting much attention. It is a very simple thing, as will be seen by the cut shown herewith. The tube is of the regular type made by this firm, with the addition of a chemical bulb and a pointer. To operate the tube, it is connected up in the usual way. The pointer is set so that no spark passes from pointer to chemical bulb. When the vacuum gets up to the desired point, set the pointer so that an occasional spark jumps across the air space. This will force a small amount of gas into the tube and lower the vacuum. This continues at intervals while the tube is in use. With this attachment, a tube can be run for a long time without attention or increase in vacuum. These tubes are selling very rapidly.



ADJUSTABLE TUBE.



COMPLETE X-RAY OUTFIT

$65.00

CATALOGUE "K."

Static Machine, Two Tubes, Tube Stand, 6x6 Fluoroscope, Electrodes for Therapeutical Work, $9.00 per Set.

--- WITH THIS OUTFIT THE FINEST KIND OF WORK MAY BE DONE. ---

Goods on Exhibition and for sale by

J. N. SCOTT & CO.,
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SWETT & LEWIS COMPANY,
79 Franklin Street, *BOSTON, MASS.*

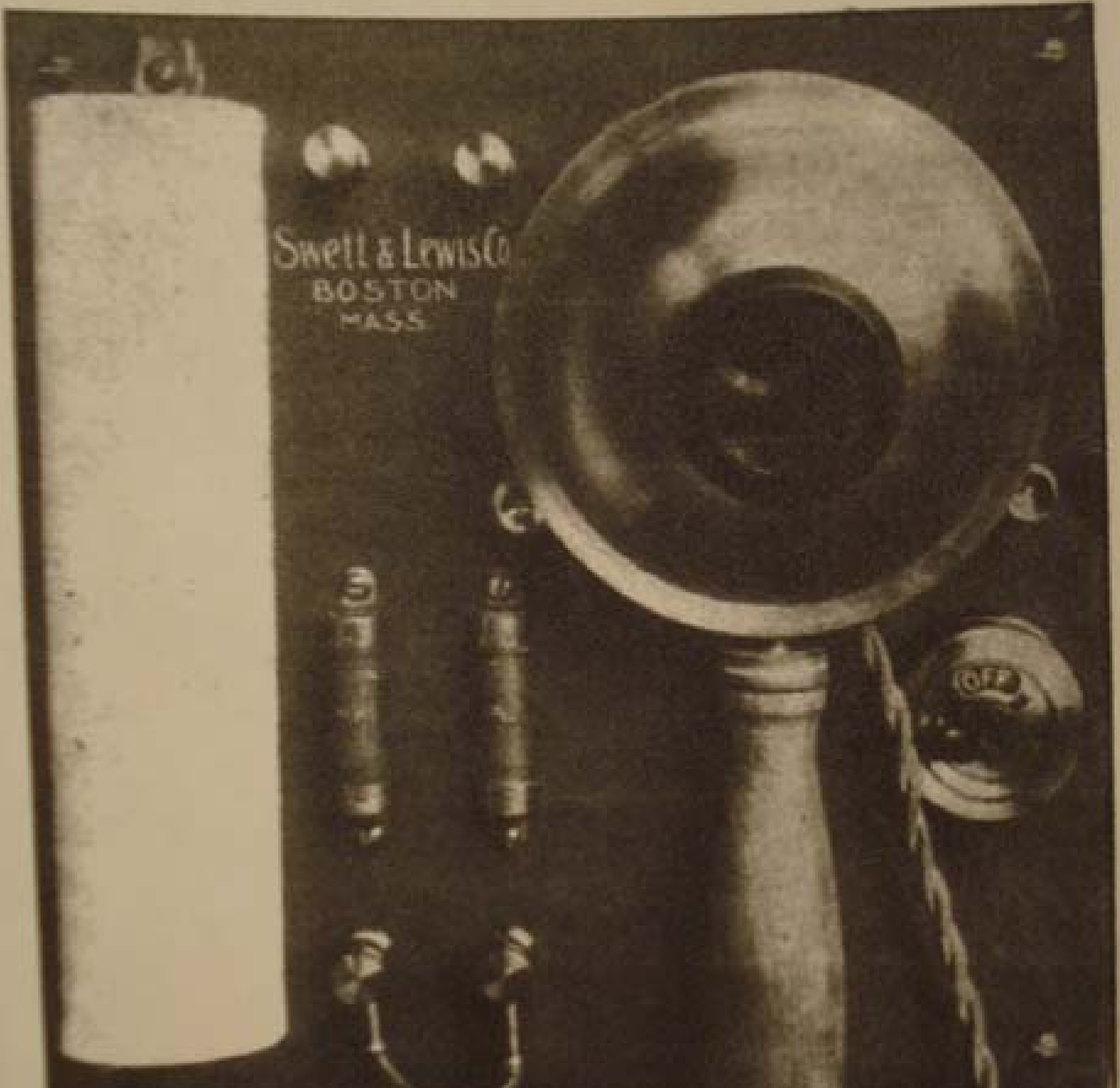
NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armementaria.

THE BOSTON LAMP.

The lamp shown in the cut above is designed to run from any direct-current lighting circuit, and is used for ultra-violet work. The instrument is simple, compact, and substantial. It is mounted on a piece of slate twelve inches square. At the extreme left is a resistance tube, which regulates the current and allows the proper amount to pass. The wires from the incandescent lamp socket are attached to the binding posts, just above the name in the illustration.

To operate, the lamp is removed from the slate, the crystal lens brought into direct contact with the area to be treated, and the lens used as a compressor. The electrodes used are of iron. They last for hours, either steady or intermittent running. It is but the work of a moment to insert new electrodes. The rays given off from the lamp are rich in ultra violet, and almost all light rays are excluded. It is not necessary to use water or any other cooling device. There is absolutely nothing about the lamp to get out of order.



The price of the outfit complete is but thirty dollars. The manufacturers are Swett & Lewis Co., 18 Boylston Street, Boston, Mass.

Swett & Lewis Co.
BOSTON
MASS.
OFF

MRS KINRAIDE ASKS SEPARATE SUPPORT
Special Dispatch to the Globe
Boston Daily Globe (1872-1922); Dec 7, 1920; ProQuest Historical Newspapers Boston Globe (1872 - 1923)
pg. 7

MRS KINRAIDE ASKS SEPARATE SUPPORT

Hearing of Action Begun In Barnstable Court

Special Dispatch to the Globe

BARNSTABLE, Dec 6—A case involving two prominent persons whose city home is in Jamaica Plain and whose Summer residence is a beautiful estate on Spectacle Pond, Sandwich, was given a special hearing before Judge Hopkins of the Probate Court this afternoon. The proceeding is that of Mrs Ethel S. Kinraide, who petitions the court for separate support from her husband, Thomas Burton Kinraide.

Mrs Kinraide alleges excessive intoxication on her husband's part for a period of 10 years, from 1910 to 1920

Mrs Kinraide testified that she became acquainted with Mr Kinraide when she was four years old at the home of her mother, Mrs Rachel Ford, who conducted a boarding house in Boston.

She testified that in 1899 when she was a small child she and her mother went to live at Kinraide's home, her mother having accepted a place as housekeeper. When she was 15, she testified Kinraide proposed marriage.

Her mother, she said, favored the marriage and in February, 1905, when 16 years old, she was married to Kinraide, who was then 40, at Savannah, Ga

Her husband was intoxicated about three days a week most of the time from 1910 to 1920, she said, with an occasional letup.

Once a dictaphone was found in her mother's room at the Jamaica Plain house, according to witness.

She also testified about her husband's purchases of liquor from a wholesale house, telling how she used to empty part of liquor into the sink and fill the bottle up with water and how she found early this year a complete copper still in full operation in the Jamaica Plain house.

The plaintiff said her husband has never taken her to the theatre more than a dozen times, and never to public motion picture shows; that he would never allow her to attend dances, but that when Kinraide took her out to supper his conduct was generally noisy and disturbances often followed.

Mrs Kinraide further testified that her husband used abusive language towards her and cast reflections on her character.

The plaintiff testified that she was in constant fear of being attacked by her husband. Once she took a large hunter's knife out of his pocket, she said. She felt obliged to have at the head of her bed or under her pillow a hardwood stick. Once, she said, he came into her room with a big searchlight, and another time hunted all over the house for her in Jamaica Plain, but as she had hidden in a closet, her husband failed to find her.

Several times during the hearing the testimony became so spicy that the witness, through her attorney, William Adams, begged leave to be heard in private.

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SENSATIONAL STORY BY MRS KINRAIDE
JOHN J DONOVAN
Boston Daily Globe (1872-1922); Dec 8, 1920; ProQuest Historical Newspapers Boston Globe (1872 - 1923)
pg. 1

SENSATIONAL STORY BY MRS KINRAIDE

Admission Involves Her Husband and Mother

MRS RACHEL FORD (LEFT), MOTHER OF MRS KINRAIDE, AND MRS ETHEL S. KINRAIDE, WHO SEEKS SEPARATE SUPPORT.

Mrs Ford Tells of Relations With Man Who Wed Daughter

By JOHN J. DONOVAN

BARNSTABLE, Dec 7—The ghost of Ravenscroft, the impressive, wireless equipped mansion of 25 rooms, high on a hill on Spring Park av, Jamaica Plain, stalked through the courtroom today and the rattling bones made public marital secrets which will surprise and shock residents of Boston and the Jamaica Plain district as well as the Barnstable Summer colony, to whom the Hermitage, the Summer home of the owner of Ravenscroft, is known

Rarely has there been a baring of a secret similar to that which was listened to by a handful of townspeople, mostly witnesses when today, a daughter seeking separation from her husband told the court that she left her husband because of a revelation made to her by her mother of the latter's relations over a period of 28 years with the man who, 15 years ago, became her son-in-law.

Two hours later, on the same witness stand, the mother told her life story, and as her daughter had done earlier, stepped to the bench and privately told the Court the secret.

THOMAS B KINRAIDE.

Testimony a Surprise

It is doubtful if anyone in the courtroom other than the immediate parties

Continued on the Tenth Page.

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SENSATIONAL STORY BY MRS KINRAIDE

Continued on the Second Page.

to the suit and their counsel from Boston, had any inkling of the sensational testimony that was to be spread upon the court records in an action by Summer residents in what purported to be a simple separate support case, in which the allegations were gross and confirmed habits of intoxication and cruel and abusive treatment.

It was the second day of the case, which opened yesterday before Judge Hopkins in a special session of the Barnstable County Probate Court. The plaintiff in the action is Mrs Ethel S. Kinraide, aged 33, and the defendant, her husband, Thomas B. Kinraide, 56, scientist, inventor and research worker. Mrs Kinraide is widely known in the women's clubs of Boston and Jamaica Plain, while her husband has a National reputation in the X-ray and wireless world.

During the war Mr Kinraide was engaged in research work in the wireless field for the United States Government, his work being done at their Winter home, Ravenscroft, which is equipped with the most modern laboratories, operating rooms and equipment, including a private wireless.

It was testified today that more than 30 years ago Ravenscroft was built for Mr Kinraide by a Mrs Reed, who died many years ago, but who provided in her will for an income for Mr Kinraide of $20,000 yearly to carry on his research work. It is understood she adopted Mr Kinraide. The income, it was testified, comes from stock of Tiffany's, New York, London and Paris jewelers. According to Mrs Kinraide, her husband's income is now an additional $5000, or $25,000 in all.

Mrs Kinraide yesterday in her direct testimony, which was directed by her attorney, William Adams, told of instances where her husband was intoxicated, saying that these averaged three times a week. She also told of being struck with a magazine by her husband and added that he threw water at her.

Asks Woman About Letters

Suddenly Attorney William A. Morse of Boston, trial counsel for Mr Kinraide, tossed the bomb into the open and startled nearly every person in the court.

Mr Morse, in a calm and deliberate manner, had been reading extracts from letters written by Mrs Kinraide to her husband, letters in which she expressed great love and affection; letters in which she had sent "packs of love" and "quarts of kisses" and which on the witness stand she said were merely the kind that a niece would send to her uncle or a daughter to her father.

An alleged illegal operation in which connection the name of Dr Jane Bishop had been mentioned was denied by Mrs Kinraide, when suddenly Mr Morse said: "As to March 11 or 12, 1920—at that time did your mother tell you what her relations had been with your husband?"

Mrs Kinraide answered "No," only to have Mr Morse ask another question on the same line: "Do you remember the occasion when your husband and mother were present that your husband asked you if your mother had told you of her relations?" ask Mr Morse.

"It was not until July, 1920," responded the witness. Mrs Kinraide denied that her husband had asked her the question March 12 and said that day statements had been made against her mother's and father's previous history, but that nothing said about her mother had influenced her. The father of Mrs Kinraide, according to her mother, Mrs Rachel Ford, died many years ago.

Tells Story to Court

Pale and with face drawn, but in a voice that was clear and without a tremor, Mrs Kinraide said that the statement was made July 21 and that there were present her husband, her mother and her husband's sister, Mrs Carpenter. She hesitated for an instant and looking at Judge Hopkins, said in a voice that was slightly lower and had a faint suspicion of tremor, "I would like to make that statement in private."

Mr Morse replied that he had no objection and, accompanied by his associate counsel, Edwin C. Upton, he stepped to the bench, where they were joined by Mrs Kinraide, Atty Adams and the court stenographer.

The courtroom was still as a tomb while Mrs Kinraide, in a voice that could not be heard beyond the bench, told what she had to say. The spectators with one accord looked toward the bench in the center of the courtroom where Mrs Ford was seated. The face of the plump, gray-haired woman did not betray the slightest emotion, but she had dropped the knitting which had been receiving her attention for sometime previously during the hearing.

Concluding her repetition of the statement Mrs Kinraide stepped down from the bench and resumed her chair on the witness stand.

"Did you believe it?" asked Mr Morse.

"I did," said the witness. She then said that she went to Boston that day with her mother, but denied that her mother told her to go and get a divorce or that divorce was talked of.

Pressed regarding any previous knowledge, she said that many circumstances had influence with her.

Attached Husband's Property

Mrs Kinraide said that after leaving the house she consulted attorney Adams regarding having all her husband's property attached. In order that her husband might not know of it she returned to the house, but lived in a separate apartment until Aug 6, when her husband came home and told her that he had been attached.

She left the house the next day. Mrs Kinraide told Mr Morse that her reason in returning was "to deceive him regarding the proceedings she intended to take." She denied that there was any talk of his having his property put in her name.

She was asked regarding a trip to Philadelphia, where she talked with a Mr Tuttle, a cousin of Kinraide, regarding the alleged drunkenness of her husband and a "wild look" in his eyes. She denied that she said she would not return to her husband unless he turned his property over to her.

She admitted that her mother, in her presence, had declared that Mr Kinraide "was a figurehead." Asked why, she replied "that was the role he took." She said that three times her husband had thrown water in her face and once he struck her with a magazine during the 15 years they had been married. She admitted that the night of Aug 5 she had a hammer and a club near her bed and, for two or three years previously, kept a bed slat near at hand. She said she kept it as a means of self defense, but never had to use it.

After leaving home July 21, she said her husband followed her down the road and, after asking her if she "hadn't made fools enough," said he wanted to put them on the right road. She denied any conversation urging her to return home.

Asked if he had offered to go away himself if it would make things happier, Mrs Kinraide said that was after the "Hell-cat scene" Dec 27, 1917, at Ravenscroft. On that occasion she said that there was a party in the house, that her husband was intoxicated and that she went and hid in a closet. She said he searched for her, saying he was looking for that "Hell-Cat." Asked to explain, she said he told the guests that he meant his wife, according to witness.

Took Pride in Scientific Work

Witness said her husband took great pride in the scientific workshop that was set up in the house. She said she knew that Mrs Reed had built the house for him and that he had inherited money from her for the express purpose of devoting his time to scientific purposes. She admitted that there was a washing machine in the laboratory and said that he did not object to her sleeping in his library.

She was asked about an accident to her when she was 12 years old. Mr Kinraide experimented on her with an X-ray machine and, through her clothes, she was serevely burned. She was asked if he were not greatly worried because he feared serious injury and possible future consequences.

"He wanted to make all possible reparation in his power, and for that reason offered to give his fortune, or was willing to marry you and provide for you?" said Mr Morse. Mrs Kinraide said she knew that such a conversation took place, but did not hear it. Her mother told her of it recently, she said. She denied that when she married Mr Kinraide at 17 she took the X-ray into consideration.

She admitted that during a 10-day illness of her husband last February she did not enter his room, saying that he had not spoken to her for some time. Then followed the questions that caused the sensation at the hearing, after which she was excused.

"Mrs Rachael Ford," called attorney Adams. The gray-haired mother of the previous witness then took the stand. She said that she met Mr Kinraide in Philadelphia in 1892. Her husband was living at the time, but died in Denver a few months later. She said she next saw Mr Kinraide at the funeral. In July she went to Bass Rocks on his invitation. She and her little girl stayed there three weeks. She said he called on her "afternoons, evenings and mornings."

From Bass Rocks she said that Mr Kinraide was going to visit his home in Moncton, N B, and invited her to go along. Witness said she took her child to New York, returned and went to Moncton for three weeks.

Tells of Kinraide's Visits

Later she went to New York for the child and then passed a few weeks in the Catskills, after which she said Mr Kinraide invited her to come to Boston, which she did in September. For six weeks she and her child roomed on Tremont st and then she hired a rooming house on Columbus av Nov 16, 1892, and conducted it for seven years.

"What was the relationship?" asked attorney Adams.

"He was a very devoted lover," she said. Kinraide was accustomed to visit the house each day, she added. In 1899 witness said that Mr Kinraide showed signs of breaking down and needed help in his work and "the only thing to cure his head was for me to go to his house," said Mrs Ford. One day she heard he was building a house and she was surprised, for when she came to Boston he had told her he was not wealthy.

It was in 1899, after being urged day after day, that she went to the Jamaica Plain house, taking her child with her. She said she never left there until July of this year. For two years, she said, her sister acted as housekeeper. Later, the witness said, she took charge and hired and fired and paid the bills, Mr Kinraide signing the checks. The witness several times remarked that she always sat at the head of the table. She also opened and read his mail, and in many cases answered it.

She said that in the early days, about three or four times a year, things would get unpleasant and she would depart, only to return quickly. She told of ordering cases of whisky, as there was always a supply in the house.

On March 12, she said, Mr Kinraide "called us in the operating room and said that he had picked me up in the streets and tried to reform me." Other things were said. She said that later he went to her daughter and said: "Ethel, so help me God, everything I said was a lie." She said "Go in and tell my mother," and he did.

Friends From 1892 to 1920

She then told of an incident, when, she said, while he was under the influence of liquor it was necessary to threaten him with the police to get him to bed. His nephew put him to bed, witness said.

She said that she had a row with Mrs Carpenter, Mr Kinraide's sister, July 21, and that she finally said: "Daughter, do you want mother to bare her relations with Burton Kinraide? . . . I will. I did."

She then asked permission to tell her story in private and her request was granted.

"Our friendship started in '92 and ended in January, 1920," said Mrs Ford. Court then adjourned to tomorrow morning.

Mrs Kinraide at the morning session had said that she did not love Kinraide at the time she married him and that it was after marriage that she cared for him. She said that she had written him loving letters before and after marriage, but that her love was merely the love of a niece or a daughter. Other letters she said were merely to keep things smooth.

Witness said that she had never agreed to marry her husband, but that it just happened, for someone said she was to marry him. She said her mother wanted her to marry him and had urged it. Up to a year before marriage she called him "uncle" and signed her letters "Honey Bud."

She said she had a luxurious car and a bank account of her own. She said that many times she avoided him and there came a time when she became tired of his kisses. "I did not like them to excess—not too often," said the witness.

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KINRAIDE PRINCE, MRS FORD SAID
JOHN J DONOVAN
Boston Daily Globe (1872-1922); Dec 9, 1920; ProQuest Historical Newspapers Boston Globe (1872 - 1923)
pg. 1

KINRAIDE PRINCE, MRS FORD SAID

Mother-in-Law Continues Testimony of Relations

Dictagraph in Jamaica Plain Home Discovered by Wife

Nurse Among Witnesses in Separate Support Case

By JOHN J. DONOVAN

BARNSTABLE, Dec 8—Marrowbones and mushrooms, a dictaphone, a copper contrivance that was alleged to be a still and the fourth dimension, were injected into the testimony in the Kinraide separate-support action in the Probate Court before Judge Raymond Hopkins today. Thomas B. Kinraide, Jamaica Plain inventor, scientist and research worker, who is being sued by his wife, Ethel S., prominent in Boston and Jamaica Plain club circles, was severely arraigned in the testimony offered by witnesses for his wife.

Several witnesses were heard, but the greatest interest was manifested in the continued direct testimony as well as the cross-examination of Mrs

Continued on the Seventh Page.

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KINRAIDE PRINCE, MRS FORD SAID

Continued From the First Page.

Rachael Ford, 63-year-old mother of the plaintiff, who yesterday admitted the existence of a relationship with her son-in-law, that his wife alleges is the reason that she left him last July.

She apparently made not the slightest effort to dodge the issue, and though on a few occasions she matched wits and tongue with attorney William A. Morse, counsel for her son-in-law, for the most part the story was told with a frankness that was startling.

"Too much vague innuendo in this case so far," protested attorney William C. Adams, for Mrs Kinraide. . . . "Nothing vague in your witnesses," replied attorney Morse, when Mr Adams objected to a line of cross-examination conducted by Mr Morse of a witness from Philadelphia for the plaintiff.

For the most part the testimony concerned allegations of drunkenness and cruel acts of throwing three glasses of water and the striking of Mrs Kinraide with a magazine and the continuation of the life story of Mrs Ford.

Bread and Mushrooms

The commissary of the Kinraide household came into the case early when a witness said that the respondent raised a question about two loaves of bread at 17 cents each, yet during the week the sum of $30 had been spent for mushrooms. On another occasion he is alleged to have placed a kettle of marrowbones on the dining-room table and was abusive when other members of the family would not partake of the delicacy.

Testimony was given to the effect that Kinraide would become enraged and scowl and glare when members of his household failed to appreciate and comprehend a learned exposition on the "Fourth Dimension," a subject upon which Mr Kinraide was rated as an authority.

It was declared that last March Mrs Kinraide discovered some sawdust behind a radiator, and investigation showed that a dictaphone had been installed. Following an alleged stormy scene in Ravenscroft, Mrs Kinraide traced the wires to her husband's laboratory and ripped out the contrivance, it was stated.

The laboratory was mentioned in testimony today, when the mother of Mrs Kinraide was asked regarding a "still." She said she saw a copper kettle steaming on a gas stove and liquid dropping into a glass container. Some of the liquid at times was cloudy and at other times was clear. She was not permitted to give an opinion on the mixture, but said there were three 10-gallon tanks of molasses in the laboratory.

Dr Bush, the Kinraide family physician, was the first witness called today. His testimony was short. He admitted he had been called to the house to treat the respondent and found him suffering from over indulgence. On cross-examination the physician said that he had always found Mr Kinraide to be a courteous gentleman and kind to his family.

"He was extremely fond of his wife," said Dr Bush. Regarding the use of liquor, he said that he thought Mr Kinraide "took too much."

Mrs Rachel Ford was then called and took a chair on the witness stand. She had a vinaigrette in her hand and from time to time, during the recital of the story of her life after meeting Mr Kinraide, she inhaled the smelling salts.

In the course of her statement regarding abusive language, she told about the defendant gesticulating and gritting his teeth. Halted by Mr Morse, she inquired if that was not abusive language. The attorney waived the question. She told the court that the respondent had thrown a china powder box at her; that it dented the casement of the door and the powder was scattered all over her. Regarding the water throwing incident she said it occurred after Mrs Kinraide complained about her husband following her when she left the house. According to the witness he said he did it to protect the honor of his house and when Mrs Kinraide told him not to do it again, it is alleged the water was thrown.

Various Names Alleged

Various names such as "Hell-Cat," "She-Devil," "Bone and a hank of hair" and "Vampire" were, according to the witness, a few used by the husband to his wife. Then came a scorching cross-examination by attorney Morse, associated with whom is Eugene Upton.

Witness denied that it was in a house of bad character that Mr Kinraide first met her and then took her from. She denied that her sister found her in a hotel in Philadelphia with Mr Kinraide, when the sister was searching to notify her that her husband, Robert H. Ford, had committed suicide in Denver. She said that she was at a theatre. She said she was 35 years of age when she met Mr Ford in 1892 and that he was 27.

Mrs Ford said that she met Kinraide for the first time in the Keeley Motor headquarters in Philadelphia. Keeley was the famous perpetual motion motor wizard who swindled hundreds of thousands of investors out of their money by a clever contrivance that made a motor appear to run of its own accord. He was almost 30 years ahead of the modern 50 percent wizard, Charles Ponzi. The witness said she was there to witness a demonstration for scientists.

She admitted that while she lived in the Columbus-av house she had an operation performed, and named Dr Jane Bishop, but maintained that all arrangements had been made by Mr Kinraide.

The incident of the experiment in the early days of the X-ray that resulted in her daughter being badly burned was then gone into. She said "He offered to marry Ethel," and the witness said that "I did not care, because he wanted her."

"But why, if she did not love him, even though he wanted her, did you advise her to marry him?"

"I thought that he would be better to her than anyone else on earth . . . He was to me."

Asked if she had said that Mr Kinraide was a "prince," the witness admitted it and said she still thought so. She said he was a walking philanthropist for the people of the town of Sandwich.

She was then pressed hard by her interrogator about her relations with the respondent up to last January, a month after her daughter had locked her door on her husband.

"I hate to say these things about Mr Kinraide," parried the witness.

Mr Morse persisted, and witness said that Mr Kinraide followed her to the woodshed, the workshop, the small room and other places.

Asked how she knew that Mrs Kinraide had ceased marital relations with her husband, witness said Mr Kinraide told her.

Didn't Think She Could Be Spared

She was asked by counsel why she did not leave the Kinraide house, and the witness answered, "I did not think I could be spared." She said it was table talk that Mrs Kinraide was not a wife.

On redirect examination attorney Adams introduced several letters and a postcard written many years ago to Mrs Ford by the respondent. Several were written from Savannah. In them he called her "Dear Sweetheart" and twice referred to a blank check that he had left with her instructing her to fill it in and cash it immediately if anything happened to him. In one letter he said to fill it in for $5000 instead of $3000, as he had previously directed.

He said that he was lonesome without her and sent her lots of kisses and love. An accident policy dated 1901 for $6000, indorsed by Mr Kinraide and made payable to Mrs Ford, was offered in evidence. The witness was then excused.

William Tuttle of Philadelphia, a cousin of Mr Kinraide, was the next witness. He and his wife had been summoned by Mr Kinraide, but in order to permit them to return home without unnecessary delay Mr Adams allowed them to testify today.

Mr Tuttle said that Mrs Kinraide telephoned him in Philadelphia after her separation last Summer from her husband. He met her and she told him that Mr Kinraide was acting brutal and was "practically insane."

He said that he went to Atlantic City, where Mr Kinraide was, expecting to see a wild man, but found Mr Kinraide otherwise. There was nothing to indicate drinking or insanity.

Failed to Effect Reconciliation

He said that Mrs Kinraide talked to him about the Tiffany stock held by her husband and he told her to forget about the financial part and think of a reconciliation. She said that was not all of it, for, so far as a reconciliation was concerned, all she had to do was unlock her door. She said that she was trying to effect a settlement and that if there was a reconciliation it would spoil the settlement.

The witness said that he tried to get Mrs Kinraide to have luncheon with himself and Mr Kinraide the next day, to effect a reconciliation, but she told him that she had heard the other side; that blood was thicker than water; that "Burton" (Mr Kinraide) had twisted him around his finger as he did everyone, and she refused to attend the luncheon and returned to Boston.

On cross-examination, the witness said that he had been at Ravenscroft in Jamaica Plain three times in 10 years and was never in the hermitage, the Summer home in Sandwich, until after the trouble this Summer. His visits to Jamaica Plain were only a matter of "calls."

Up to the time of the trouble, he said, his wife had never been at the Jamaica Plain home and but once in Sandwich, and that for a period of 10 days.

He admitted that he had said that unless there was a reconciliation "the situation for her would be intolerable." He also admitted saying, "Well, Ethel, of course you are a handsome woman . . . You still have your life before you."

Wanted House and Half of Stock

Mrs Tuttle's testimony was short. She said that Mrs Kinraide told her that her "husband had turned against her"; that she ought to have one of the two houses and half of the Tiffany stock. Witness said that Mrs Kinraide said there had not been any marital relations for sometime; that her door was locked and that she would maintain the stand until a settlement was effected. There was no cross-examination.

Mrs Edna Y. Brown, a witness for Mrs Kinraide, admitted that she did not like Mr Kinraide and told why she did not like him. Little appeared to be gained by the rigid cross-examination. She said that she was a school teacher, married two years ago. She said that she was at the Hermitage every Summer from 1906 to 1916 or 1917. In 1918 she went to Jamaica Plain and was a member of the family from October, 1917, to January, 1919, when she married. She said she saw the respondent drunk many times and that there were always cases of whisky and beer at both places.

She introduced the marrowbones story into the testimony. The witness said that Mr Kinraide came in the dining room laughing and staggering and after placing a kettle on the table, he insisted that everyone eat marrowbones and was angry when some persons refused to eat. She also mentioned the discourses on the fourth dimension.

Says Kinraide Snubbed Her

On Dec 27, the witness said, she went into the Jamaica Plain house and there were Christmas trees all over the place for decoration. She was accompanied by a friend. The witness stated that Mr Kinraide ignored them. Suddenly a loud gong started ringing and it continued until her friend decided to go.

Witness said she saw Mr Kinraide hiding among the greenery; that there was something shining in his hand and that there was a glare and terrifying look in his eyes. She said she went to the third floor, where she found Mrs Kinraide trembling, and she brought her into the room. Mrs Brown said she could hear him going through the house saying he was looking for "that hell-cat." He fell, and she saw him carried upstairs, and his face was cut. The next day, witness said, a nurse was called and took charge of him.

Cross-examined she said that she was a second cousin of Mrs Kinraide. She admitted receiving sums of money from Mrs Kinraide. She said there was an understanding that she do her share of the work for her board. Witness said she worked harder than she ever did at home and presumed the money was gifts in consideration of same.

She admitted that she did not like the respondent very well; that he had never invited her to the house; that he was never pleasant to her; had snubbed her and walked by her.

"I don't like a drunken man, and I love Mrs Kinraide," said Mrs Brown. She was excused.

Nurse a Witness

Jessie H. McDonald of 150 Huntington av, a trained nurse, now in the drug business, was on the stand when court adjourned. She said that she had lived at Ravenscroft both professionally and as a member of the family. The respondent, according to the witness, was drunk two-thirds of the time the witness was at the house. She said that she took care of him on many occasions and that she had called Dr Bush to attend Mr Kinraide. She was questioned regarding tablets prescribed for emergencies and there was a secret consultation at the bench.

Court then adjourned to Friday morning.

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MARRIED GIRL OF 16 FROM SENSE OF DUTY
JOHN J DONOVAN
Boston Daily Globe (1872-1922); Dec 12, 1920; ProQuest Historical Newspapers Boston Globe (1872 - 1923)
pg. 21

MARRIED GIRL OF 16 FROM SENSE OF DUTY

Severely Burned in Laboratory, Kinraide Testifies

Wanted to Make Life Easy—Tells of Relations With Mother of Wife

By JOHN J. DONOVAN

PARNSTABLE, Dec 11—A sense of duty prompted Thomas B. Kinraide, Jamaica Plain research worker, to marry a 16-year-old girl because, through his experimental zeal in X-ray research, he had burned her so severely that authorities expressed the opinion that the girl might at a future date suffer intense agony. That those moments might be prevented by expert treatment, or at least alleviated by loving care and any luxury that his fortune could buy, he married the daughter of the woman who had been his friend for 13 years previously.

That is the story that Kinraide told Judge Raymond Hopkins in the Probate Court today. He testified that for many years before he married Ethel S. Ford, the daughter of the woman who sat at the head of his table, hired, bossed or fired the help, contracted the household bills and paid them in checks, many of them in blank, he had treated the little girl with every kindness and courtesy, almost that of father and child, in fact such that the girl in her letters always addressed him as "Dear Uncle."

Kinraide in Own Defense

It was in his own defense in the separate support action brought by his wife that Mr Kinraide took the stand today and told from the day of his meeting Mrs Rachael Ford, whose husband later committed suicide, to within a year or so of the present time. His testimony, given in slow, almost halting tones received keen attention from everyone in the courtroom. He rarely hesitated long, but it was evident that his task was a distasteful one and he answered questions simply, rarely volunteering any information.

The early days of his acquaintance with the woman who later became his mother-in-law he attempted to pass over swiftly, and it was only after careful questioning by William A. Morse, his trial counsel, that he gave the information sought by his attorney.

Coming to the time in his X-Ray experiments when he sought to perfect the then existing apparatus and develop a machine of more penetrating qualities, he told of the accident to the child, who at the time was virtually a ward in his home. Subjects for experiment at the time he said, were scarce, and he welcomed the offers of his nephews, Will [illegible] Little Ethel Ford and some other members of his household.

The experiments were conducted in his wonderfully equipped laboratory at Ravenscroft, the Spring Park-av residence, built, equipped and furnished especially for his researches in the scientific world by his foster-mother, Mrs Reed, now dead, who provided that during his life he should have an income of $20,000 to carry on his work.

Tells of Laboratory Accident

Apparatus of the early '90s developed trouble with the coils and also penetrative power. According to Mr Kinraide, those early experiments, though they brought severe burns to his young subject and resulted in his marriage, led to important discoveries by him in the X-ray world. Among other inventions in that same laboratory in after years was the telefunken, a widely-known form of spark gap for wireless, the patent for which he disposed of. Other patents increased his income so that his gross last year was $25,000.

Too often he operated on the child and severe burns resulted. In those days little was known of an antidote for X-ray burns and the scientist, broken in spirit according to his story told today turned to the woman whom he says he met in a Philadelphia resort in [illegible], and later placed at the head of his household at Ravenscroft during the Winter, and at the Hermitage at Sandwich during the Summer, and told her of his sorrow and regret at the happening.

He told her that at some future date he feared for the health and life of her little girl that deaths were known to occur that in some cases the flesh became stripped from the bone and that frightful suffering was caused. He took the entire blame and told her that she could sue him in the courts and probably recover a large sum of money, but that money was no consideration in the matter.

His fortune, he said today, he offered at that time and was willing to go away. The other alternative he offered was marriage, for he said, "I feel that it is my duty to devote my money and life to care for her and the only way I can do it unhampered would be to marry her."

The girl did not love him. She has already admitted it. Her only reason for marrying him, she has said under oath, was because her mother wanted her to and Mr Kinraide wanted the marriage. Her mother wanted her to marry Mr Kinraide, saying she believed he would be better to her than any other man on earth. They were married in Savannah in 1905.

Tells of Suicide of Ford

Going back to the early days of his intimacy, Mr Kinraide today said that the night of May 22, 1920, he was registered with Mrs Ford as "R. S. Ford and wife" in the Collonade Hotel in Philadelphia. There he said, Mrs Ford's sister with a telegram announcing the suicide of Mrs Ford's husband in Denver found them. He remembered advancing some money, a matter of $100, or $150 for the burial. Mr Kinraide declared that up to that time he thought her a widow.

The respondent then told of Mrs Ford coming to Boston and buying a lodging house on Columbus av, of his visits there and his financial help. His Jamaica Plain mansion, gift of Mrs Reed, his foster mother, was built during the period, and in 1897 a sister of Mrs Ford was his housekeeper for two years. The sister of the respondent, Mrs Carpenter, then took charge of the management of the Columbus-av house and Mrs Ford moved to Ravenscroft. Virtually from that time in 1899 to July of this year she presided over the household affairs of Ravenscroft and the Hermitage.

Today he denied charges made Wednesday by Mrs Ford that he was responsible for an operation performed on her by Dr Jane Bishop, way back in the Columbus-av days. He blamed his wife for having had an operation performed several years ago and charged Mrs Ford with having had knowledge of it. That charge was denied Tuesday by Mrs Kinraide.

He said that early in his married life he had little of his wife's companionship and society. Mother and daughter were devoted to one another, he said, and they left him to pass his time as he pleased. He said he gave his wife two [illegible] and was "foolishly extravagant" in contributing money to make things pleasant. Of his income of $20,000 he said $15,000 went to the upkeep of his household. There were sometimes as many as four servants, he testified.

Explains Testimony About Stills

Direct testimony by the plaintiff's witnesses had referred to a still at Ravenscroft and had intimated that all liquor consumed by him since the Fall of 1918 was made by him. He said the still referred to was one that was placed in the laboratory more than 20 years ago. He said that instead of one still, there must have been at least 20 there, all different sized, from small glass ones to the copper one mentioned by Mrs Ford. He said that part of his experiments dealt with essential oils and also the recovery of alcohol from waste materials. All materials containing alcohol, after the experiments were concluded, were put in stills and redistilled so that there would be no waste of alcohol. Working at the stills he said was a kind of recreation and rest.

"Are they still there?" asked Mr Morse.

"No."

"Was the alcohol used for a beverage?"

"No."

"Was liquor made or drunk?"

"No."

The witness said he always had a case of liquor in the house for the entertainment of his friends. He was then asked about the Williams Club, of which he is president, and he said it is a club of about 50 lodge members and that he entertained them every year at his place in Sandwich. The refreshments include ale and beer.

He then told of the birth of some of his children and of his devotion to his wife. He said that though their relations were pleasant, he had none of her company. His attention was called to a happening in 1910, and he said that after threats of notifying the district attorney he was told that his wife had had an operation performed at the Hotel Pelham . . . After that time, said the witness, "I distrusted, feared and hated Mrs Ford."

Nurse Tells Story on Stand

Earlier in the day Mrs Jessie McDonald, trained nurse, had testified. She was the last of the plaintiff's witnesses. During her examination by attorney William C. Adams for Mrs Kinraide, she told of seeing Kinraide suffering from the effects of overindulgence and told of his displays of temper. She testified that he had repeatedly claimed he loved his wife, but that she did not love him and that once he said "there must be someone else." She also made a charge in private to Judge Hopkins, being overheard only by counsel and Mr Kinraide.

The respondent in his direct examination was questioned regarding Mrs McDonald and told of her stay in the house. He said that once she went away, but that he finally induced her to return. At the time he gave her either $100 or $150, he said.

Married life, according to the witness, was stormy, "principally on account of the children and Mrs Ford." He had absolutely no power to correct or interfere with their behavior, and if he did it brought on a "storm." If he spoke to correct the children he was looked upon as a brute, he said.

He is charged with striking his wife with a magazine and today gave his explanation of this incident. He said that he had built a coast and also a skating field for the children of the neighborhood. His son, Robert, was a great reader and returning home he found the boy buried in a magazine. He told the boy to go out and skate. The boy, he said, was told by his mother to stay in the house. Witness said he pulled the magazine away from the boy and Mrs Kinraide rushed at him and he pushed out the magazine to keep her away.

The other cruel and abusive treatment charge was that of throwing water on his wife. He said he returned home one night and was washing his hands, when his wife entered the room in a "tempestuous rage," compalining that he was following her. She called him a "coward," "spy" and "sneak," he said, and to make her stop, flirted water at her. She continued to call him names, he said, and he continued to flirt the water. Then he put about a teaspoonful of water in a glass and threw that. The latter was not effective, so he filled the glass and made out as if to throw that, but did not. He denied that ever during his married life did he lift his hand to strike his wife or attempt to do so.

Kinraide Denies Charges

Mr Kinraide then denied that he ever made any improper suggestion to Mrs McDonald and denied all that she said in private conversation at the bench. He denied the charges that he was drunk three times a week on an average or that he ever denied the paternity of any of the children bearing his name.

Marrowbones was then the subject of the cross-examination by Mr Morse and the respondent said that he and his children were extremely fond of eating them. He said that he often brought them home, but they were not properly cooked. He said that the marrow was eaten like butter on bread and should be served hot. On the occasion testified to he denied that he was drunk or noisy. He said he cooked the marrowbones in his workshop and as they should be served hot he brought in the kettle and fed the children. He said they all ate heartily.

Questioned regarding a night he was put to bed in the Daniel Webster Inn, he said that he had not been drinking, but was suffering from too much smoke from ripe pipes that day, which was election day. Previous to the day of the football game in New Haven, when the Yale Bowl was opened in 1914, he smoked 15 to 25 cigars a day in his laboratory work. That day, while driving with a party to the game, he froze his cheeks near Springfield, and this caused a sort of paralysis which left him ever afterward with a horror of smoke, as it gave him nausea, he said.

On one occasion, said Mr Kinraide, he returned home late and could not find anything to eat. He went upstairs and found his wife packing heavy calendars in boxes. He complained, but there was nothing stirring and he remarked . . . "possibly if I gave you another auto you might be interested in my welfare." His wife, he said, then threw one of the calendars at his head.

Gave Wife a New Auto

He said he gave his wife a new car in 1916, 13 days after a child was born. She looked out of the window and expressed a desire to ride in the car and asked the family physician, who said a short ride would do no harm. Getting into the car Mrs Kinraide accidently put the lever in reverse and when the ignition button was pressed it went backward while he was on the running board. Mrs Ford, he said, was at the window shrieking "My God. . . . My God. . . . My child." He said he told her to go in and not arouse the neighborhood.

In a few minutes Mrs Ford joined them and they rode around the Jamaicaway. This testimony was to explain an incident which was among the charges of cruelty, that of taking her to ride so soon after the child was born.

At odd moments during the morning and afternoon the defense made time to put on Sandwich residents to testify regarding the sobriety and general conduct of Mr Kinraide. Postmaster, blacksmith, carpenter, dentist, ice man, jeweler, schoolteacher, grocer, hay and grain man, furniture and undertaker, as well as a retired banker, were all called and they spoke well of him and denied they ever saw him under the influence of liquor.

There were a few exceptions to the answer "yes" when on cross-examination they were asked if they ever drank with him. It appeared that he was a good host to every caller, even if the caller came to collect a bill. It was all the same, they could partake of the good cheer of the Hermitage if they cared to. All were positive, however, that he never showed signs of having imbibed freely.

The witnesses were: Miss Rachel S. Carpenter, George T. McLaughlin, Dr Edward S. Talbot, George A. Gibbs, George E. Lapham, Fletcher Clark, L. F. Carpenter, John H. Sullivan, George L. McCann, Jerome Holway, Eugene S. Clark, James H. Keliher, John T. McHenry and James H. McCann.

Mr Kinraide will resume his direct examination Monday and several other witnesses, the last for the defense, will then testify.

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READY TO HAVE WIFE GO HOME
JOHN J DONOVAN
Boston Daily Globe (1872-1922); Dec 14, 1920; ProQuest Historical Newspapers Boston Globe (1872 - 1923)
pg. 1

READY TO HAVE WIFE GO HOME

Mother-In-Law Barred, Says Kinraide

Inventor's Testimony at Barnstable Ends

Denies Story Told by Mrs Rachel Ford

By JOHN J. DONOVAN

BARNSTABLE, Dec 13—Thomas Burton Kinraide, Jamaica Plain inventor, today told the Probate Court that he is willing to have his wife, Ethel S. Kinraide, who is suing him for separate support, return to his home, and said he will maintain her and treat her courteously and with respect, but not if her mother, Mrs Rachel Ford, attempts to return with her.

The declaration came at the end of the direct examination by his chief counsel, William A. Morse. Kinraide had been on the stand practically a full court day, though his examination was interrupted from time to time by the placing on the stand of character witnesses anxious to get home.

Attorney William C. Adams created a slight ripple of excitement when at the close of the long examination of Mr Kinraide he announced that there would not be any cross-examination.

Denies Charges Made by Wife

Many denials were made during the morning session by Mr Kinraide of allegations made by his wife. Among other things he declared that since his marriage he never has had improper relations at any time or any place. Though the action for separate maintenance was based on cruel and abusive treatment charges, his wife did not leave him, according to her own testimony, until after she had been told by her mother of alleged relations with Kinraide, before and after his marriage to Mrs Ford's daughter. Mrs Kinraide told the court in her examination, both direct and cross, that she believed her mother's story. Today Kinraide denied its truth.

Another important feature of the testimony today was a denial by Kinraide that it was not until July 21 of this year that his wife for the first time learned of the intimacy that existed between him and his wife's mother. The

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READY TO HAVE WIFE GO HOME

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scientist and research worker told the court that in March, after a visit to his attorney by Mrs Kinraide, who was threatening divorce, he told her the story of his meeting her mother and all that followed up to the time he married.

Kinraide told how his wife and mother-in-law left the house July 21. He said that he was in his shop at the Hermitage in Sandwich, fixing a boat for his son, when he heard loud voices. The respondent said that he went in the house and found Mrs Kinraide, Mrs Ford and his sister, Mrs Carpenter, in a "terrible row."

Tells of Row at Sandwich

Going in he said he heard Mrs Ford declare in a loud and angry voice "Yes, and I have been his mistress." Witness said he was so shocked and surprised that he was unable at first to realize what was going on. He heard his sister say "You told me you met him in a theosophical meeting."

Kinraide said that he entered into the row then and said to his sister, "I met her in a house in Philadelphia."

At that point the witness declared his wife rushed in front of him and shaking her fist shrieked at him, "Why didn't you marry my mother?" Kinraide said he told his wife the reason he never married her mother was that "she had a terrible temper, and I absolutely could not do so."

According to the respondent, Mrs Ford then declared that the relationship continued all during the married life and Kinraide told the court that he told Mrs Ford: "It is an absolute lie and you must pack your things and leave the house immediately." "With a malicious grin," Kinraide said, "Mrs Ford jeered at me, saying, 'Now you have lost your wife, what are you going to do about it?' she then said, 'Let's go.' "

Witness said he announced that Mrs Kinraide was not included in the orders to leave the place and that in fact he did not want her to go and told her so. Mrs Ford, however, said the witness, ignored him and told his wife to go and put her clothes on right away and start for Boston, where the court was in session, and that Mrs Kinraide could get a divorce.

Mrs Kinraide, according to the witness, was reluctant to do so. He said he visited Mr Adams at the Daniel Webster Inn, where the latter told him that he had been engaged by Mrs Kinraide and had already begun proceedings by placing an injunction on his property and an attachment on his bank accounts.

Thought Action Ill-Advised

Witness said he told his wife he thought that court action was ill advised, that no good would come of it and that it was not necessary to go to such extremes. "I told her" said Kinraide "that it was a treacherous thing to do, to come back home and deceive us."

According to Kinraide his wife told him she was glad that she had fooled him and that she had played her part to perfection. "Since then," said Kinraide, "she has been away."

If given control of the children, he said he would devote all his means to their education.

At that point he was asked if he would take his wife home. He left the witness stand and resumed his seat back of his counsel. His head was bent down and his wife half turning in her chair, stared long and hard at him. Her face appeared strained and troubled.

Kinraide earlier in his testimony admitted he allowed himself to be put to bed, but at the same time he said that he received a beating from his wife and Mrs Ford. He said that the night after the incident in March, when he told his wife about his relations with her mother, he tried to get his wife to talk to him or let him into the room, where she was with Mrs Ford. She would not answer him, and he said he went to the shop to do some drinking. He said he might have taken one high ball and then returned. He said he induced the women to go upstairs. He said they were under the impression that he was drunk, and on account of the strained situation he said that he thought he would let them retain the impression.

They put him to bed, when, he said, he remembered that he had left some valuable papers in his unlocked desk and attempted to get out of bed and go down to get the papers.

Says Women Pounded Him

He said that the women held him in bed by the ankles and that when he persisted in his efforts to get up, they pounded him. He said he finally got away, but that in the mix up his clothing was torn. Before he could get down stairs his wife threatened to call the police unless he got back into bed and he said he went to bed.

He was charged with being under the influence of liquor at the time of the Joffre parade in Boston and last July 4 at Sandwich. He denied the allegation and said that he had obtained a window at the Thorndike for his family to see the parade and that he drove them there and back. July 4 he said he drove the family to the fireworks and back.

Kinraide was questioned regarding the health of his wife a few years ago and he said that she appeared to be healthy and weighed 225 pounds. Later she took a course for reducing and is now considerably lighter.

His wife was extremely indifferent to him, said Kinraide, and did not care for his company or his companionship during their married life. He said that she never sought his company and that during the entire 15 years of his married life he never had an opportunity to sit down for a whole evening and chat alone with his wife. His mother-in-law was always around and he said that she constantly interfered in any arguments he had with his wife.

Kinraide told the court that he was devoted to his children, and many times when they were teething he sat up half the night with them. The children would cry in pain or from bad dreams and his wife never responded. Kinraide said that at times he waited an hour to see if she would awaken and go to the children, but that she did not and he visited them.

About 50-50 on Not Speaking

Regarding the charge that at times he did not speak with his wife, he said it was about "50-50," for there were many times when she did not speak to him. He said that once he ordered a nephew of his out of the house because Mrs Kinraide became too hilarious over what the nephew was saying and doing. Kinraide said he always had liquor in the house and that Mrs Ford always ordered it.

Many character witnesses testified during the day. They said they never saw Kinraide under the influence of liquor. For the most part that was the extent of opinion asked of them.

Mrs Jennie B. Kingsbury, a character witness, injected a little novelty into her testimony by declaring that she would not listen to words said by Kinraide and his wife who were squabbling. She said she was sleeping near the Kinraide room at Sandwich, Aug 5. She said she was within hearing distance "if she listened."

"Did you take any precautions not to hear?" asked Mr Morse. Witness said she did, adding, "I buried my head in the pillow, for I was a friend of both." She would not deny that she begged Mrs Kinraide the next day to leave the house for her safety.

William Davidson, an electrician, who lived at the Jamaica Plain house said that he is a nephew of Kinraide and that he came to Massachusetts in 1891 with Kinraide and Mrs Ford from his home in Moncton, N B. He said he had keys to both the Summer and Winter places and lived there much of the time, and for most of the time had been in Mr Kinraide's employ.

He said that many times he was called to the house by the women, but often did not go, or, if he went, found Kinraide ill in bed.

Says Kinraide Struck Him

He said at the time that Kinraide ordered one of his nephews out of the house he interfered and Kinraide struck him, the only time in all their association. He admitted that on several occasions he had helped the women put Kinraide to bed and said that once he, alone, put Kinraide to bed.

Among those who testified to Kinraide's sobriety were Alberta M. Ripley of Moncton, N B, who in 1902 was brought to Boston by Mrs Ford and Kinraide; Mrs William Davidson of Jamaica Plain, Mrs Bessie Fraser of Somerville, Miss Olivia Davidson of Somerville, Frederick K. M. Durkee of Brookline, Gustave E. Wicksell of Roslindale, John Edward Callahan of Jamaica Plain, Della King of Jamaica Plain, at one time a maid in the Kinraide home; Katherine Tracy of Roxbury, who also was a maid; Anita Stanley of Newark, N J; Rev Harold L. Pickett of Woburn and John A. Holway, register of deeds of Barnstable.

Court adjourned to tomorrow morning at 9:30, but it is understood that the Kinraide case will not go on until Wednesday, when all evidence should be in by noon and arguments completed by late afternoon.

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MRS KINRAIDE WINS SEPARATE SUPPORT
JOHN J DONOVAN
Boston Daily Globe (1872-1922); Dec 16, 1920; ProQuest Historical Newspapers Boston Globe (1872 - 1923)
pg. 1

MRS KINRAIDE WINS SEPARATE SUPPORT

Given Custody of the Children—Judge to Fix Payment—Will Appeal, Asserts Husband

By JOHN J. DONOVAN

BARNSTABLE, Dec 15—Mrs Ethel S. Kinraide of Jamaica Plain is justifiably living apart from her husband, Thomas Burton Kinraide, by a decision given late this afternoon by Judge Raymond Hopkins in the Probate Court. Mrs Kinraide was given the custody of their four children.

Judge Hopkins did not set the allowance to be paid by Mr Kinraide from his admitted income of $25,000 a year. The amount will be determined later by the court. It was announced by Mr Kinraide and his counsel that the finding of Judge Hopkins would probably be taken to the Supreme Court.

The arguments in the case were in just before 3 o'clock. Judge Hopkins then caused surprise by asking counsel for both parties to join him in his lobby for a few minutes. Immediately the impression became general that Judge Hopkins was prepared for some definite decision and

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MRS KINRAIDE WINS SEPARATE SUPPORT

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would not take the case under advisement.

Attorneys William A. Morse and Eugene Upton for Mr Kinraide and William C. Adams for Mrs Kinraide followed Judge Hopkins to his private lobby. Mrs Kinraide remained in the courtroom, while her husband nervously paced the corridors. He was visibly distressed and was very nervous. After more than an hour court reconvened and Judge Hopkins then made public his decision.

Finding of Judge Hopkins

His finding was as follows.

"This case has been on trial since a week ago Monday and it has been a remarkably well-tried case. I have decided first that Mrs Kinraide has done nothing improper at any time. There are four children and I can't bring myself to think that a woman of her age, proper in conduct all her life, should not have custody of her children.

"I find she is living apart from her husband for justifiable cause. I cannot say 'Go back and live with your husbany' unless at some time she feels she should. It is for her to decide. She shall have the custody of the four children.

"As to the amount of the allowance, I am unable to state at this time what Mr Kinraide shall pay his wife. It depends much on who will pay the children's tuition, and there are so many complications I will let that stand until I find out. and also there are other expenses. ("Mr Kinraide will pay tuition for his children," said Mr Morse at this point. I can't state an exact sum he shall pay his wife.

"I find the plaintiff has maintained the allegations of cruel and abusive treatment. I find her husband used too much liquor. I won't say any more."

Kinraide "To Spend Last Cent" on Case

Court then adjourned. The decision was a distinct disappointment to Kinraide and his counsel. Kinraide was heard to declare that he would spend his last cent to carry the case to the highest courts.

Mrs Kinraide received the judgment quietly and unemotionally. Several stanch admirers of Mrs Kinraide during the long trial congratulated her on her victory in the suit.

The case was one of the most sensational in the history of separate support actions in Massachusetts.

The children are in the custody of Mrs Kinraide and have been during the trial.

All evidence in the case was in shortly after 11 o'clock this morning, and William A. Morse, chief counsel for Kinraide, argued for the defense.

Referring to Mrs Ford he said she saw in Kinraide a chance for a life of ease and plenty. He quoted Mrs Ford's opinion of Kinraide when she put her daughter in his arms.

"She had known him for 13 years and she had urged that Ethel become his wife, and she said she would let no other man marry her daughter," said Mr Morse.

The attorney then asked if Mrs Kincaide lacked the necessities of life and called attention to the blank checks drawn on Boston stores where Mrs Kincaide could fill in any amount she desired.

He said Mrs Kinraide has sufficient temper, surliness and uncharitableness not to enter her husband's room when he was ill, and it seems to me that if any one should bring a complaint of cruel and abusive treatment it was Mr Kinraide.

MRS ETHEL S. KINRAIDE

Mr Morse blamed the trouble on Mrs Kinraide, saying she wanted to get control of Kinraide's property. He ridiculed the charge of drunkenness and characterized Kinraide as one of the unfortunate men who are abused in their own home and then asked to excuse themselves to the persons who abused them.

"Mrs Kinraide always lived in fear that Mrs Ford, who was of such an ungovernable temper, would give out the story of their relations, and when she did he tried to calm down this fanatic old woman," said Mr Morse. "But she left the house and tried to force a settlement where she would receive a large sum of money" Mr Morse continued.

"Mrs Kinraide's place is back home where she was never hurt, where she would never be." Mr Morse added. He said he did not think Mrs Kinraide believed the story told by her mother as to the relations with Kinraide

Argument of Wife's Attorney

Attorney Adams said Mr Morse had pictured Kinraide as an impressionable youth of 22 meeting a matured woman of 35 in 1892. Mr Adams declared Kinraide was not an impressionable youth, but rather a man of remarkable mental equipment with an inquiring mind from boyhood.

He denied any mercenary motive on the part of Mrs Ford, who had money when she came to Boston, though Kinraide told her when she came that he did not have any. "If she was mercenary," said Mr Adams, "why didn't she drop him? She took a lodging house and supported herself and he ingratiated himself so that the child called him 'Uncle Burton.'

"This respondent never earned a dollar in his life and his researches were never practical to extent of bringing in a dollar. He took Mrs Ford and her daughter into his home and she conducted practically all his affairs so that he had his entire time to devote to his shop."

Mr Adams then made a declaration not heard in open court during the trial, and as it was not objected to, it is presumed it was given in private testimony. He declared that when Ethel Ford was 14 years of age Kinraide had her dismissed from school and took her in town to lunch. According to Kinraide his wife, when he married her, as he says at 17 years of age, was a large woman weighing 185 pounds.

Regarding the X-ray burn that Kinraide claimed was his reason for marrying her, attorney Adams said the burn healed in one year, and that before marriage there had been three years in which to learn if she had been incapacitated.

Regarding Mrs Kinraide's trip to Philadelphia, he said that it was made with the intention of protecting the interests of her children and not from mercenary motives of her own.

"This is a most significant case," said counsel. "The petitioner admits all the creature comforts and luxuries, yet comes in here for separate support. She does not ask for a divorce to get loose. She knows that a large division of property cannot be secured by these proceedings. She saw it meant having a home of luxury, and would she have submitted herself to the humiliation of this case unless driven to it?"

He said his client should not be ordered to return to Mr Kinraide, that she was justifiably living apart and asked the court for custody of the Kinraide children.

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TREATMENT OF ACUTE ROENTGEN RAY DERMATITIS

By **W. J. DODD**, Boston.

I feel as though one should apologize for mentioning such a subject before a gathering of Roentgenologists, some of whom have probably not seen such a condition, certainly not in their own practice.

Two or three years ago this paper would have been unnecessary; today, I am afraid it is. Powerful apparatus is being installed in many small hospitals as well as in private laboratories. Untrained and unqualified men may be put in charge. If this be the case, sad results may follow and much harm be done, both to the individuals as well as to this wonderful and valuable branch of medical work.

Dr. Pfahler has already sounded a warning. The advent of the great invention of Dr. Coolidge has added another source of danger if placed in the hands of those ignorant of its power. Roentgen therapy in certain uterine conditions has opened up a great field. Unfortunately this will not be used by Roentgenologists alone as it should be.

It is this fact that leads me to suggest that you, as Roentgenologists, will see probably more cases of X-ray dermatitis in the future than in the past, because you will be called in consultation to see them. Such has been my experience, in the last two years more than ever before.

Twelve cases have come under my observation in the last year. Seven cases of alopecia resulting from exposure for frontal sinuses; three resulting from a small high frequency coil used in dental work, and two from fluoroscopic observations to determine the presence if possible of a Pott's fracture. One other, the most severe, was following the treatment for a lesion on the back of the hand for lupus. The frontal sinus cases were all exposed through aluminum filters, a large transformer being used, repeated exposures rather than long individual exposures being the cause of the injury.

It is this experience that prompts me to emphasize Dr. Pfahler's warning given some time ago. We all know that there is absolutely no danger when the trained Roentgenologist does this work. Occasionally we are going to get reactions in certain cases where Roentgen therapy is applied and it is to this class I particularly suggest this exceedingly simple and absolutely efficacious remedy.

To many it is undoubtedly familiar. The prescription is an old one and not original. I was first led to use it seventeen years ago. A boy came to me with his hands all covered with huge blebs and stained a deep yellow as though he had been burned with nitric acid. I told him that I thought it was a nitric acid burn, but he assured me that he had never used nitric acid and stated he had been running a small rubber plate static machine at the Food fair, exhibiting his hand through the fluoroscope.

The treatment given was what is known as white-wash. The lesion completely healed. I have never yet seen a case of acute X-ray dermatitis where it failed to completely heal the lesion except in two cases that were sent in to the hospital for treatment. These cases had progressed to the sloughing stage, and in such cases it is useless except to relieve the pain. In these cases there is always a deep central area that does not yield to this treatment.

The wonderful application of radium as demonstrated by Dr. Eugene Caldwell, or excision followed by skin graft, is the only treatment. In chronic X-ray dermatitis it is of no use except to relieve the irritation.

Mr. Kinraide, of Boston, who was exposed more than many operators, shows no lesions on his hands. He always bathed them in bicarbonate of soda solution. I have tried the same treatment in several cases as a preventive and am sure that there in some argument in favor of this method. These were desperate cases and the patients were told a reaction might result. I was sure it would, if preventive treatment had not been applied. This was before the use of filters. Recent experiments lead me to the conviction that this simple remedy is a preventive as well as a cure for acute X-ray dermatitis and we hope soon to publish the result of these experiments.

If we are correct, I believe we can give multiple massive doses without getting a reaction. Of course, we can use filters, but if we can get more energy to the part to be treated without danger to the skin and underlying structure, we shall gain just so much more. This is only a suggestion and experiments must be carried out before advising this method.

The treatment for the acute Roentgen dermatitis is as follows:

R.	Zinc Oxide	½ oz.
	Phenol	½ dr.
	Glycerine	1 dr.
	Aquae Calcis	8 oz.

Shake well and bathe area for five to ten minutes, twice or three times a day. Avoid all heavy dressings and when possible expose the lesion to the air. Do not apply this remedy on a dressing and allow to remain for five to ten minutes, but sop it on and let the air get to the lesion. Under no conditions use an ointment. Use a fresh quantity of wash every time it is applied, and do not leave exposed to the air.

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The X-Ray in Country Practice.

By THOS. S. BLAIR, M. D.
Neurologist and Electro-Therapeutist Harrisburg Hospital, Harrisburg, Pa.

The several ways of generating current to excite X-ray tubes all have their advocates, but "the man behind the gun" counts more than the method. Before purchasing any form of X-ray outfit, a physician who has not kept up with the advances in physics should review thoroughly the general principles of electrophysics and should have done sufficient amateur photography to know how to develop negatives and make Velox prints. He should then thoroughly study a text book upon X-ray work. Probably the most thorough work written especially for physicians is the book by Francis H. Williams, M. D., and published by The Macmillan Co. Commencing X-ray work without thoroughly "looking up" is an expensive practice, as not only is apparatus speedily ruined, but the patient is apt to be injured and photographic dry plates are wasted.

Several forms of generators are available for country practice where there are no electric mains to be had. Where such service is comparatively near or the physician possesses an electric automobile, as a few quite near to electric light plants do, the storage battery charged by dynamo service enables one to do as effective work as is done anywhere. A water motor will successfuly drive a static machine provided a pressure of about 24 pounds is available. A tank and windmill will supply this amount of pressure and the motor is eminently adapted for this kind of work. A gasoline engine will also successfully run a static machine, but the initial cost for a good engine is rather high and they are not very cleanly machines to handle.

When a coil is used instead of a static machine, a combination of storage cells and gravity batteries gives very reliable service; but 20 to 30 gravity cells are required to keep charged the 4 or 5 cells of storage battery. This arrangement gives a very even current, but involves the care of the not very cleanly and the rather bulky gravity cells. Probably the most effective method is to use primary battery cells to excite the coil. Many forms are recommended, but the writer much prefers the Edison Lalande as being the most steady in current delivery and maintaining itself to the limit of its life without marked fall in potential or amperage. Some 15 to 20 type S cells are required, costing about $2.75 per cell. Quite heavy X-ray work can be done with this type, but the very heaviest coils require the type W cell at about $4.75 per cell.

With this latter type, cautery work can be successfully done and surgical motors actuated. In selecting an X ray outfit it is well to have the power selected and adapted by the maker of the coil or static machine, since he knows the requirements of his own machine.

Now a word as to static machines and coils. Recently there has been a great effort made to adapt static machines previously used for therapeutic purposes to X-ray work and it has resulted in hundreds of physicians being supplied with utterly inadequate apparatus. It is usually safe to reject the cheap machines. They cannot be wholly condemned as it is remarkable how American ingenuity can devise and put upon the market a workable static X-ray outfiit for less than $200; nevertheless the physicians who buy them and are delighted with them at first, gradually come to a realization of the fact that compared with the generators in use by X-ray experts and the large hospitals, their machines are inadequate except for very light work. The writer fails to see wherein all this ado over static machines has resulted in any very tangible improvement in them and the older makes are still making as good static X-ray outfits as are on the market. An imposing array of brass balls emphatically does not constitute a static machine. The Toepler-Holtz machine usually gives the best satisfaction. Boston seems to have had a fad in this line and it has resulted in making this city and its environs the home of the most highly developed static X-ray generator. To do really high grade X-ray work with a static machine run at ordinary speed requires an outlay of over $750.00 for an outfit. The mica plate machine made in Chicago by R. V. Wagner & Co. is an excellent machine of the high speed type. High speed has both advantages and disadvantages, but the fact remains that acceptable X-ray work can be done on a comparatively small and cheap machine capable of being run at high speed. The 8 and 12 plate mica machines are to be recommended, but it is imperative that a good motor be used, as it is impossible with any static machine to do good X-ray work running the machine by hand. The writer believes that a really good static machine is preferable to a coil for fluoroscopic work, but for photographic work longer exposures are required than with a coil. With patience upon the part of the operator as fine static results have been obtained as any coil has to its credit, but the practical manipulation of a static X-ray outfit is not "an unmitigated joy." Most of the experts prefer a coil. As to the coil itself there is little choice between those of reputable make. The Heinze Electric Co. of Lowell, Mass., make the heaviest coils and tubes that are manufactured and by connecting a high frequency coil in the Leyden jar circuit exceedingly satisfactory static effects for therapeutic and X-ray work are to be had. Their installations are expensive, necessarily. All coils of the Ritchie type are excellent if honestly manufactured. Queen & Co. of Philadelphia, as well as Morris E. Leeds and other makers of the same city, have developed a great range of coils for different types of work. While the Heinze Co. are advocates of electrolytic interrupters, the Philadelphia makers prefer a vibrating mechanism. The advantages and disadvantages just about even up in my experience. There are several excellent coils made in the west, but I have had no experience with them. The Kinraide coil is a rather remarkable apparatus, but must be handled according to methods of its own, when it does beautiful work. The dispersive effect of its secondary discharge is a trifle annoying but break downs do not occur and the workmanship is superb. The writer believes that, on the whole, a coil is better for country work than a static machine.

Much might be said as to tubes. There is no need to go to Germany for tubes, as better ones are made in America or made by Americans in Germany. The Queen self-regulating tube is the best in principle of any made. R. Friedlander & Co. of Chicago, make splendid tubes for static machines, but be sure you get their better grades, as they make for some of the larger advertisers a cheap tube that is not at all satisfactory. Sweet & Lewis Co. of Boston, make excellent medium priced tubes. The Heinze people make the heaviest tubes on the market and they have extremely fine definition, but their weight requires special tube holders. Doubtless there are many other good makes, but the writer has spoken only of makes of apparatus with which he has had experience.

Permit a final word. If a country practitioner can give the time and study to do really scientific X-ray work and can lay out $500.00 for an outfit let me urge him to proceed, expecting to encounter difficulties and to overcome them; but

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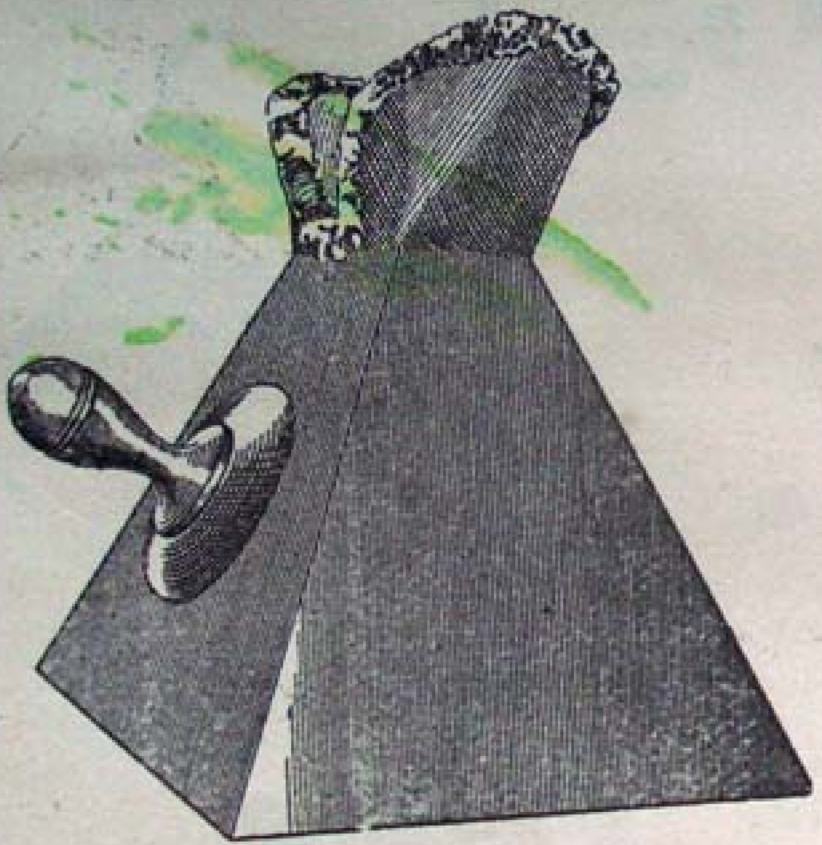
if he cannot really perfect himself in this work and goes into it as a mere money-making side issue, with cheap apparatus and slip-shod methods, for the benefit of science and all that a true physician holds sacred let me advise him to keep out and leave the field to the *real* worker.

218 Locust St.

FLUOROSCOPES AND SCREENS



of the recently discovered Fluorescent Crystals are being used by a large number of physicians, hospitals and experimenters, in place of tungstate of calcium and other salts, as they accomplish the result of showing each image undimmed by previous exposure or phosphorescence, make clear the most vague shadows which can not be traced when calcium of tungstate is used, and are absolutely instantaneous in effect.

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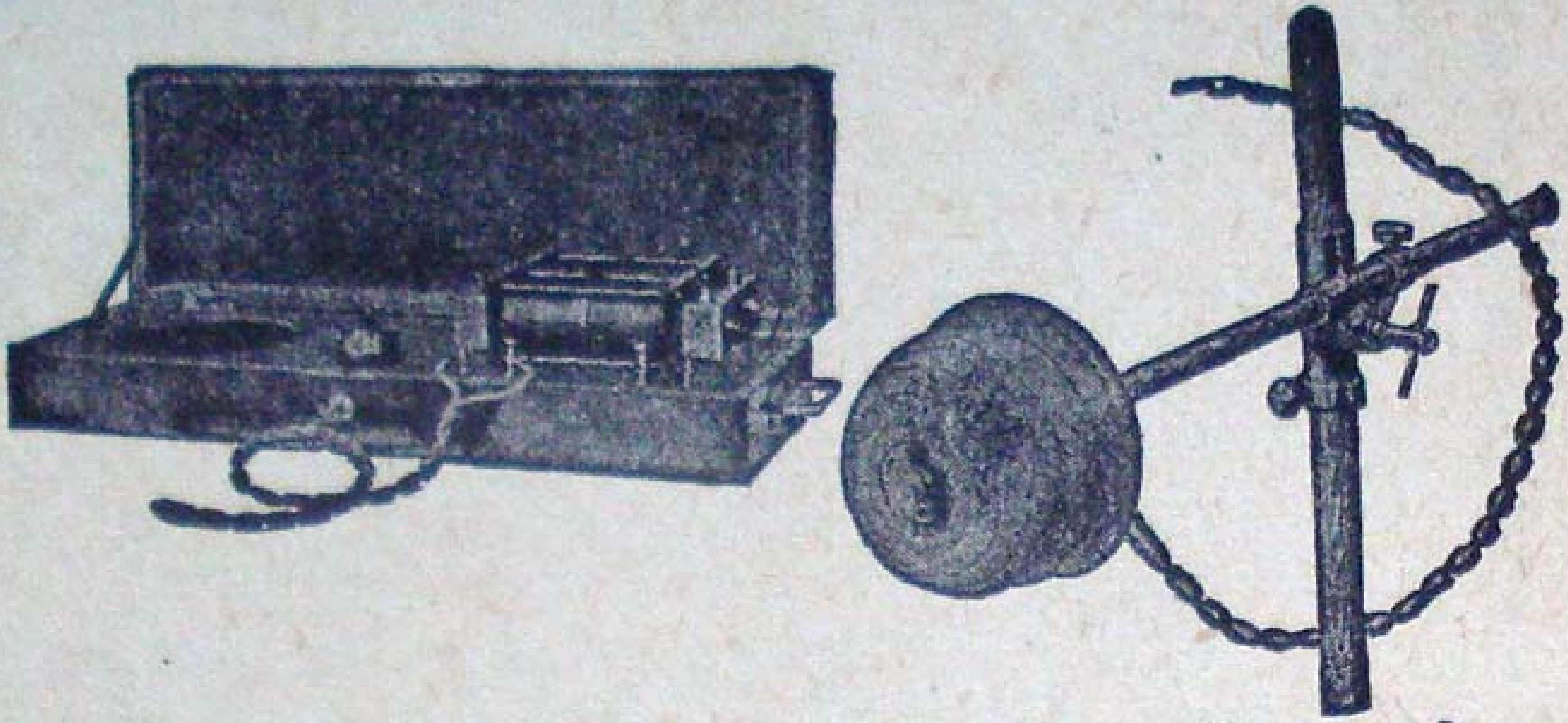

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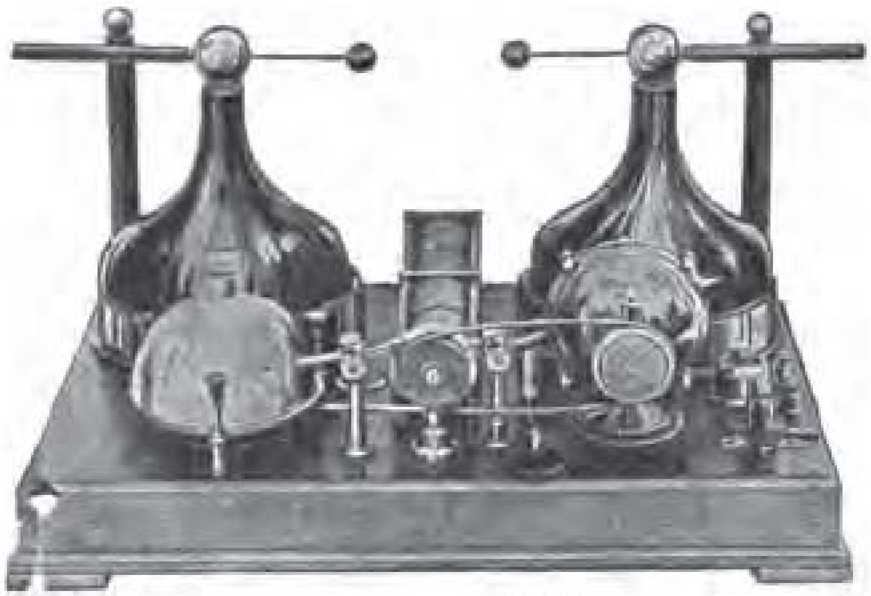

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THE KEELY MOTOR.

John W. Keely, the inventor of the Keely Motor, died Nov. 18, 1898, aged 72 years. He will be known in history by the title he gave himself when asked by a doubting friend what epitaph should be placed upon his tombstone. With a seriousness which was not assumed, he answered: "Say that he was the Greatest Humbug of the Nineteenth Century." This was within a year of his death.

The alleged motor was a fraudulent device which Keely claimed was operated by a force hitherto unknown to science which he had discovered; that this force existed in nature and by proper devices it could be utilized without cost; that, having discovered it, he was endeavoring to devise practical means for putting it to commercial use. These claims were first brought to public notice in 1873. While they were derided by the few as being absurd, they were popularly believed to have some foundation, and this belief was strengthened by the fact that several well-known scientific gentlemen who saw some of Keely's experiments during the winter of 1873-4 were unable to discover any fraud, although they were not allowed to examine the apparatus. During the following year exhibitions were made before capitalists of this city, New York and Boston, and demonstrations of a powerful force were made which Keely persuaded them was produced by the "disintegration" of a few drops of water. Such exhibitions of power lost nothing of their marvelousness in the telling, and imaginative newspaper reporters through the columns of the press created an enthusiasm over Keely's discovery which made many people doubt whether the physical laws of nature had been correctly stated in the text books.

Keely had inspired enough confidence in his claims within a few months to warrant the organization of the Keely Motor Company with a capital of $5,000,000. One of the most plausible arguments used in floating its stock was that, if Keely established his claims by bringing out a commercial engine, all present sources of power would be superseded by the "etheric force" evolved from a thimbleful of water, in which case a single share of the stock would be worth a fortune to its possessor.

Unlike most great inventors, Keely had no education. He was first known as an inventor by his exhibition of a perpetual-motion apparatus on Market street, a couple of years before the advent of his motor. In physique he was a powerfully built man, about six feet tall, broad shouldered, square jawed, muscular, and fond of exhibiting his great strength. He spoke very rapidly, and when explaining his experiments obtained the confidence of the listener by an apparent freedom from anything looking like a concealment of facts. His language abounded in words which were used out of their ordinary meaning, so that an investigator would learn nothing from any explanation of his relating to the character of his force or the means of controlling it.

There were two periods in the history of the Keely Motor which must be borne in mind in order to gain a clear understanding of the character of the claims made by Keely, and the experiments by which he supported them. The first period covers his claims to the production of force by the disintegration of water. He pretended to accomplish this by an apparatus called the "Liberator," which confiding stockholders of the Keely Motor Company will see pictured on their stock certificates. The second period began about 1886-7, when he made claim for a new discovery of a force derived from the vibration of some hitherto unknown fluid between the atoms of the illimitable ether. This second claim was brought out after the Keely Motor Company, discouraged by Keely's failure after many years to bring out any practical commercial motor, had ceased to supply him with funds for his experiments or his support.

During the first period there was a wild speculation in the stock of the Company, due largely to the almost hysterical reports in many of the newspapers of what had been done by Keely, and more especially to the fact that men of well-known scientific ability in other fields than physics, had not only indorsed Keely's claims but had also purchased the stock. It is not strange, therefore, that there were many thousand stockholders in Philadelphia and other cities—clerks, shop-girls, widows and orphans—all looking for the day when the increased value of their stock would make them independent. A check was given to this speculation by a few conservative newspapers of the country, notably *The Ledger*, which from the beginning pointed out the absurdity of Keely's claims, and published the opinions of such well-known physicists as the late Dr. Cresson and Dr. Barker, whose partial investigations led them to believe Keely's claims to be fraudulent.

What became of the money which came to Keely as his share of the great sums raised by the sale of the stock is a matter of conjecture. He lived in good style, was free in the use of money, gave to charitable enterprises, purchased some diamonds "as an investment," as he told a friend. But the withdrawal of financial aid by the Keely Motor Company seemed to leave him without resources, and the public seemed to have become incredulous or indifferent, when a paragraph published in 1881-2 caught the eye of the widow of Bloomfield H. Moore, the paper manufacturer. It related that the inventor, still working to perfect his apparatus, was on the verge of starvation and despair. Mrs. Moore, in speaking of the incident, said she had just been reading of the suicide of an inventor in New York who had been unsuccessful in getting any one to take an interest in his invention, which after his death was seen to have been a valuable one. Here, she thought, was an opportunity to save another inventor from a like fate. She made inquiries, called to see him, and supplied him with means to go on with his work.

Within a year or two after this rehabilitation of his fortunes Keely announced the discovery of his vibratory force. In the meantime Mrs. Moore had become a convert to his theories, and with her pen and large acquaintance in this country and Europe, gave wide circulation to these theories, and revived the hopes of the Keely Motor stockholders. But Keely gave the Company to understand that it had no interest in his new discoveries, and to test the question a stockholder, in 1888, brought suit to compel him to show wherein the two discoveries differed from each other. The Court ruled that Keely should explain the difference, and on his refusal to divulge his secret he was sent to prison for contempt of court. A compromise was effected by his agreeing to permit a mechanical expert to examine the apparatus, and upon the report of the expert that there was a radical difference between the two discoveries Keely was released from confinement.

Mrs. Moore, thoroughly believing in Keely's integrity, invited the leading physicists of this country and Europe to examine and report upon the discovery. The few who accepted the invitation were not permitted by Keely to handle the apparatus, or to do more than to remain spectators of his experiments. Some came away puzzled with what they saw; others formed theories of how well-known forces of nature would account for the results produced; but nothing they could say or publish could shake the faith of Mrs. Moore or Keely's followers generally.

After an absence of several years in Europe, Mrs. Moore returned to this country in consequence of litigation in connection with her trusteeship of her husband's estate. Her championship of Keely's fortunes was an element in the case, and, to fortify her position, she endeavored to get several well-known physicists to examine Keely's inventions, feeling that in their advanced state of perfection the experts must make favorable reports. These gentlemen (among whom were Edison and Tesla) all declined, urging various reasons for not taking up the investigation. In November, 1895, Mrs. Moore invited Addison B. Burk, President of the Spring Garden Institute, to make an investigation. Mr. Burk without declining, asked to have associated with him Mr. E. A. Scott, an electrical engineer, and ultimately Mr. Scott took charge of the work. Mr. Scott accepted with alacrity, as he was familiar with the history of the Keely movement, and had talked with the inventor about it in 1874. He was also familiar with the views of the United States Government engineers, before whom Keely had performed some experiments at Fort Lafayette. His first visit to Keely's workshop, No. 1422 N. Twentieth street, was made with Mrs. Moore on Nov. 9, 1895, and the afternoon was spent with Keely. On this and all subsequent visits he gave Keely no impression that he did not accept the inventor's statements as truth—as a question indicating doubt, or a statement of a discovery made, would have prevented him from seeing other experiments, where he might get further confirmation of his belief in the fraudulent character of the experiments. Many things were shown at this interview, some of which the investigator had heard spoken of several years before. Among these was the levitation experiment, by which heavy weights rise and fall in water in response to musical notes produced on certain pitches. This experiment had been shown to admiring investors and investigators from the earliest days of the mystery, and had always been very effective. Mr. Scott left the building that day satisfied that the experiments witnessed did not depend for their explanation upon any hitherto unknown source.

On the second and third visits Mr. Scott was accompanied to Keely's laboratory by Mr. Burk. These gentlemen, agreeing upon a line of observations, confirmed several of the conclusions arrived at by them after a discussion of the first day's experiences. The principal point proven to their satisfaction was that compressed air was used in nearly all the experiments, either as the moving force, or as auxiliary to some other force more powerful but hidden from view. As an instance of this, the rise and fall of the weights in a jar of water, closed at the top, was found to be the rise and fall of hollow globes and discs, delicately balanced, so that an increase or decrease of pressure in the inclosed air space above the water would make them sink or rise to the surface. This variation of pressure was produced by the introduction or abstraction of air into this space through a small tube which Keely called a solid wire. At one visit Mr. Scott, unobserved, picked up the end of the wire and showed it to Mr. Burk, calling attention to its hollowness. The tube was a feature common to nearly every piece of apparatus in the laboratory. Other equally fraudulent apparatus which had excited the admiration of many prior investigators was proven to be operated on well-known philosophical principles, and there was not the slightest evidence of the discovery of any hitherto unknown force presented by Keely. The gentlemen so reported to Mrs. Moore, who was very much surprised at the conclusion arrived at.

In February, 1896, Mrs. Moore sent for an English physicist, Prof. W. Lascelles-Scott, her object being to have Keely communicate his secret to him in case he should die before completing his commercial engine. The Professor was to take apart any of the apparatus, and have full instructions from Keely as to its use. After a month's investigation, the Professor stated at a Franklin Institute meeting that "Keely has demonstrated to me, in a way which is absolutely unquestionable, the existence of a force hitherto unknown." Shortly after this Mrs. Moore invited Mr. E. Alexander Scott to witness an experiment at the laboratory devised by Professor Scott, especially to convince Mr. Scott that he was wrong in the conclusions previously stated to her by himself and Mr. Burk.

An afternoon was spent at the laboratory with the result that the conclusions before reached were fully verified, and in a most remarkable and unexpected manner, the Professor being unacquainted with the grounds upon which those conclusions had been arrived at. At Mrs. Moore's request, Mr. Scott spent the evening with the Professor, at the conclusion of which the Professor agreed that it would be fair to both parties to have the experiments repeated by Keely, and that Mrs. Moore should cut the so-called wire while the experiments were in progress to see if it were a tube. Mrs. Moore agreed to require this of Keely. The following day, Sunday, May 3, 1896, Professor W. Lascelles-Scott had an interview with Keely, the result of which he communicated by letter of same date to Mrs. Moore, in which he said: "To my surprise, he declined point-blank to repeat the demonstration of Saturday, *just as I was told he would do.*" The Professor urged upon Mrs. Moore "the absolute necessity of winning Mr. Scott's opinion at once, in Keely's own best interests as in yours." He also said: "It would be rashness to discuss the subject further at the Franklin Institute;" and without calling upon Mrs. Moore, he left the country. Mrs. Moore, on May 4, 1896, withdrew her financial support from Keely.

As a member of the Engineers' Club, Mr. Scott, in January, 1898, read a paper detailing the principal facts above referred to, and prior to that Mr. Burk illustrated the fraudulent character of Keely's claims by public experiments at the Spring Garden Institute. One of the strange things shown by Keely was a steel bar, with a minute but not continuous hole in it, which he said he had sensitized with hydrogen gas. On being struck it vibrated, and gave forth two musical sounds about two octaves apart and very persistent, one at each end. Pupils of the Spring Garden Institute reproduced it under Mr. Burk's direction. As made by them it was a hollow tube containing two tuning forks, but with the end pieces so cunningly joined to the main body that the piece of steel appeared to be whole. This had no sooner been shown to Mrs. Moore than Keely declared that his bar had been lost. He expressed no great regret, though a few weeks before he had valued it at $40,000. Evidence was afterwards found that Keely's bar was made exactly in the same way. The counsel and several of the Keely Motor Company's Board of Directors were present at the Engineers' Club when the paper was read, and were permitted to discuss it. On the following November 18 Keely died, and the Motor Company took possession of Keely's laboratory. They called to their aid T. Burton Kinraide, a Boston electrician, who had been in communication with Keely. The laboratory was dismantled, and the apparatus was taken to Kinraide's laboratory, where he is said to have endeavored to complete Keely's work. The dismantled laboratory was explored by Mr. Scott and Mr. Burk, and abundant evidences of secret devices were everywhere visible. Under the ground floor an immense hollow steel ball was found, which in the early days had been used as a compressed air reservoir, and tubes were found under the floors and concealed in the walls. The globe had not been used for several years, the air pressure required in the latter-day experiments being supplied by rubber bulbs and rubber tubes, which were also found in great numbers among the rubbish left by the Keely Motor people.

The whole scheme of fraud was finally laid before the world by Charles J. Hill, counsel for John W. Keely's widow, on January 29, 1899, when he published the fact that shortly after December 20, 1898, while examining Keely's laboratory, Mr. Kinraide discovered the first evidence of fraud. A full investigation showed that rubber bulbs concealed under carpets or in some out-of-the-way place could be stepped on, and thus force the compressed air through concealed rubber tubes. The Keely Motor, or engine, was started by compressed air through a platinum tube, supposed to be a wire, the pressure setting a water motor in operation. This in turn operated the Keely Motor, a belt passing up from below through the hollow supports of the motor axis to a small concealed pulley on the shaft. The water motor was under the floor of the one-story back building. Keely had several ways of doing the same thing, so that if suspicion fell upon one he could readily use another.

Considerable indignation was expressed by many of Keely's supporters on the publication of the facts—not against Keely, but against Mr. Hill. The public generally accepted Mr. Hill's statement as true, and in April, 1899, the Keely Motor Company officially concluded that they had been deceived by Keely.

Mrs. Moore, who had been in very feeble health for several years, died at her residence in London on January 5, 1899. It was stated that after her return to England her confidence in Keely was restored, and that she continued to supply him with funds, although with much less liberality than before. The total sum invested by her in Keely's enterprise is not definitely known. It was not as large as some published statements have put it. She showed her account to Mr. Scott in 1896, and it then amounted to about $65,000. Mrs. Moore was entirely sincere and unselfish in her support of Mr. Keely's pretensions, her sole purpose being to enable Keely to give the world the benefit of what she believed to be a great discovery.

THE TRANSVAAL WAR.

For a long time the British Government, under the direction of Joseph Chamberlain, had been trying to provoke a war with the South African Republic. The Jamison raid was a part of the project. President Kruger of the Transvaal, however, proved a match for Chamberlain in diplomacy, and eventually forced Great Britain into an unjust war. After the failure of the Jamison raid, Chamberlain incited the Uitlanders to demand naturalization. The laws of the Republic were modified to meet these demands, but the English wanted to retain their allegiance to the Queen while becoming citizens of the Republic. No agreement was possible, for to concede the demands of Chamberlain would have been to surrender the government of the Transvaal to British subjects. Various concessions were made, and in the meantime the British Government began to gather an army in Natal. Before this movement had gone too far, President Kruger issued an ultimatum, and, as it was disregarded, he took possession of the passes and invaded Natal. The war began October 11, 1899. The Boers were at first successful, but at the close of this writing the British had concentrated an army of sixty-five thousand men in Natal, and were ready to proceed to the relief of various British garrisons besieged by the Boers, chiefly in Ladysmith, Kimberley and Mafeking. The war thus inaugurated is apparently one to the death. It will either result in the expulsion of the British from South Africa, or their complete control of the region. The gold and diamond fields, and the control of the projected railroad route of Cecil Rhodes from Cairo to the Cape, are the objects of the British invasion of the Transvaal.

ASSASSINATION OF PRESIDENT HEUREAUX.

President Heureaux, of San Domingo, was assassinated on July 26. He was in his fourth consecutive term. He was a despot, and had executed many military officers and civil officials or procured their assassination. But in the main he gave San Domingo a fairly good government. San Domingo appeared to be on the eve of a revolution, with Jiminez as the leader of the revolutionary party, but the United States Government detained Jiminez for a time in Cuba, and up to the close of the almanac year the government of San Domingo, under the constitutional successor of Heureaux, had not been disturbed.

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ITS STRONG POINTS:

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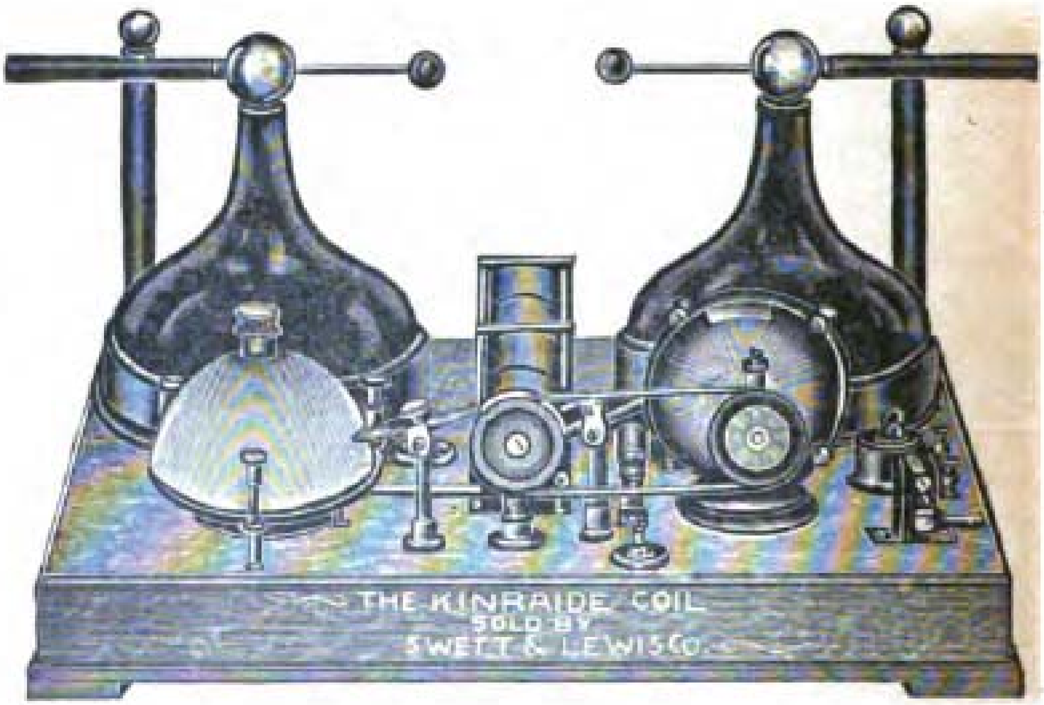

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These remedies will be considered separately.

Very prompt relief of the nervous paroxysms often follow the inhalation of five or six drops of nitrite of amyl. Still this relief is often evanescent, and I give these patients, when there is a no counter indication, an hypodermic of morphine and atropine.

But it is well, even after the patient has been relieved, to leave him some remedy which he can take and find relief from a paroxysm of dyspnoea, which may develop after the effect of the morphine has died out.

To accomplish this no remedy is more satisfactory than a solution of bromide of potassium in water, to which has been added a small amount of morphine.

The Ultra Violet Rays.

The new Violet Ray apparatus manufactured by Swett & Lewis Co., 655D Boylston street, Boston, Mass., produces the ultra violet rays in great abundance, but with little or no heat, and is, at the same time, easy to operate and uses so little electricity as to be attachable to any electric light socket.

The whole outfit only weighs 40 pounds, and, with the exception of the stand, is packed for easy transportation in a handsome mahogany box. A transformer receives the current from the lamp socket, changes it to a higher voltage and charges a condenser. When the current leaves the condenser and enters the violet ray lamp it is of the high tension, high frequency variety.

The lamp itself is a diminutive arc lamp protected by a nickel cover with a crystal lens and has iron electrodes instead of carbon. These iron electrodes are the source of the true ultra violet ray. Very little heat is generated and no water connections are necessary.

The cost of operating is not more than six to eight cents an hour. The lamp runs almost without noise, and, as few light rays are given off, the uninitiated might suppose that no results were being obtained. The rays are, in fact, however, very powerful, though invisible to the eye. If the bare skin is exposed to them for more than a few minutes an intense erythema will be produced. If the rays are allowed to strike a tungstite of calcium screen, the screen will floresce brilliantly. A common incandescent lamp will also floresce a brilliant blue. Both of these experiments must be made in a darkened room. Glass is entirely opaque to these rays.

In fact, this apparatus, which costs only $100, is compact, always certain and reliable in its action, powerful (producing, it is claimed, at least 20 times as many ultra violet rays as the largest lamp now in use), easily operated and of wonderful efficiency in the cure of various diseases of flesh tissue, such as cancerous growths of all kinds.

The apparatus is made (from patents recently issued) by Swett & Lewis Co., 655D Boylston street, Boston, Mass.

Uric Acid and Its Elimination.

Recent investigation of this subject strengthens the belief that eating too much meat is responsible for the formation of uric acid in disease-producing quantities. To dispose of meat satisfactorily gastric digestion must be active, the constitution well supplied with fluids and the organs more or less actively engaged in growth and development. These conditions cease to exist when adult life

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High Frequency Currents.

By DR. E. T. NEALEY
Bangor, Me.

IMPROVED APPARATUS AND METHODS FOR ADMINISTRATION TO DEEP-SEATED DISEASES.

Although high frequency currents and treatment with vacuum electrodes was first made known and applied in the United States, there has been done here but little work, except with French apparatus or reproductions of the same made by American manufacturers.

The manufacturers of the Kinraide Coil perfected an apparatus ready for physicians' use in August, 1904, known as the Jackson High Frequency Coil. The second one put upon the market, they installed in my office the same month. Since then, I have had it in daily use, in comparison with a sixteen plate Static machine and other coils owned by me, to satisfy myself of their value in the administration of currents of high potential, with high and low frequency.

It possesses some modes of treating patients with high frequency currents that places it in the foremost rank, if not in advance, of any apparatus for that purpose yet offered to physicians. The potential is very high, the frequency of alternations or oscillations is effected by an entirely new spark gap. It operates perfectly, and is ready to work from morning to night if needed, with but little attention except to turn on the current from the street main, either alternating or direct, whichever is supplied.

Any physician who has used coils with electrolytic discs, mercury or revolving break spark gap, will appreciate the saving to the nerves of the patient and time of the operator implied by the foregoing statement. Chisholm Williams, in his valuable little book on High Frequency Currents, cautions physicians when treating headache or nervous patients that "the sounds from the spark gap be dulled as much as possible." He says, "the spark gap is in a closed receptacle to reduce the sound of the spark. which is very considerable." "This should be cleaned frequently, as a compound of nitrous acid is formed, that may cause serious results if not carefully watched." These nitrous acid fumes and compounds cannot be avoided where such heavy electric discharges are taking place.

All of the spark gap troubles of other coils are avoided in my coil, except the latter. I have found an easy way to overcome that one and prevent the chemical effects,

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The heavy discharge from my coil, running only a few hours, is enough to coat all of the copper parts with verdigris and the sparking prisms with oxide of iron. The odor is also vile on opening the spark gap box to let in fresh air, as the makers suggest. To overcome this, I cleaned the spark gap metal parts thoroughly, and placed in the receptacle a small box of unslacked lime, and left it for one week, while running the coil four or five hours daily. The result was better than I anticipated. At the end of the week the spark gap box was opened, the copper plates and contacts were found bright with but little oxide of iron powder, and the chemical fumes were but slightly noticeable by comparison without the lime. The lime will work as well in any spark gap receptacle into which it can be placed.

The frequency of the coil is very high. This is evident from the perfect control of the current, when using vacuum electrodes or wet spongio-pilene and metal in contact with the skin or internal mucous membranes. I feel justified in my opinion that for high frequency therapy, the coil I am now using surpasses all other apparatus I have seen, in control of current, ease of administration and range of usefulness for the busy practitioner, and further, in its effect upon deep-seated congestions, local stasis and inflammatory processes.

Before referring to the cases treated and my technique for the same, I wish to call attention to some of the claims made against high frequency currents, their lack of effect below the skin.

A recognized authority* on static electricity and the therapeutic administration of the same, has claimed as follows:

"The special indication for the employment of high frequency apparatus, otherwise than with conditions producing muscular contraction," (as with the static wave current,) "seem to be in the treatment of superficial skin diseases, and localized septic processes." He says: "No conditions are so universally associated with disease as the congestive and inflammatory processes, and no influence, we believe, is so potent for relieving these conditions as electrical currents or discharges of high potential, when they induce muscular contractions in regulated frequencies and a penetrating capacity which will include the whole extent of the inflammatory process." For this reason, he "emphasizes the importance of currents of relatively low frequency, as best suited to overcome local stasis, thereby relieving acute and chronic processes of congestion and inflammation." He has emphasized the statement elsewhere, "that the currents of high frequency, when applied to the surface of the patient directly are superficial in their effect, and do not enter the tissue."

If the above statement is correct, then it is only when we produce visible muscular contraction that we overcome local stasis, increase metabolism and effect a cure by electrical methods.

I judge, therefore, by analogy, that the free application of long, fat static sparks must be superior to the electrical breeze or brush discharge, because muscle contraction is induced thereby.

From my own experience this method of treatment is erroneous, except in rare cases. It does not seem to me any more necessary to produce muscular contraction to overcome stasis and relieve deep-seated inflammatory processes than it would be good judgment to apply fat sparks to a case of neurasthenia or spinal cord disease, because an effect in every way superior may be obtained with the brush discharge or milder modes of administration.

All oscillatory currents of high potential, whether of low or high frequency, are vibratory. The currents of very high frequency produce a molecular vibration or massage in the tissue that is more effective, it seems to me, and far more pleasing to the patient, than those vibrations that shake up visible muscular contractions.

Why one can enter the tissue and the other not is beyond my comprehension, if the right apparatus is used and the electrodes are properly applied. I believe that right here lies much of the trouble and lack of penetration that is complained of by some users of high frequency currents, viz.: proper contact for the electrodes. I believe that a moist contact should always be made if possible. When we can apply a moist electrode to one side of a patient and light a sixteen candle incandescent lamp on the other side, there can be no doubt about the current entering the tissue or passing through the whole body. I should as soon expect the wave current, or the effect when giving the breeze or brush discharge fail to penetrate below the skin, as the high frequency vibrations from properly applied electrodes fail of doing so.

Vibrations that will pass through glass, hard rubber, the side of a house or a mountain, must be able to penetrate the human body, notwithstanding the great resistance of the epidermis to electric currents. The moist skin contact makes it still more easy.

It is a well known fact that the conductivity of a body may be improved or modified according as it is soaked or covered with moisture. There is no doubt but the epidermis resists any form of electric current more than the underlying tissue, some three hundred times as much it has been estimated. Every user of a static machine has noticed how dry wood resists a current, when trying to get a brush discharge from wooden electrodes in a heated room in the winter season. If the wood is moistened it works better, or, go out into the woods and cut a maple sapling and have an electrode turned from it, and note the enormous brush that can be obtained from the moist, green wood. When it is possible to pass sparks an inch or longer through the thick glass of a vacuum electrode, it is hard to believe that the same current will not penetrate the human epidermis and soft tissues to any depth necessary for treatment, especially if the skin is kept moist during the application.

The moist contact is of so much importance that I believe if we extend it to X-Ray treatment for deep-seated malignant growths and tuberculosis of the lungs, we would accomplish more than we have heretofore been able to do in those diseases. The effect of X-Rays thus used I have not as fully demonstrated as I wish to do and shall do. But why is it not a good method? When raying deep-seated diseases long enough to produce the desired effect, there is danger of X-Ray burns. I do not believe it possible to get a burn with the X-Ray tube in immersion contact with the skin, because we thereby prevent the arcing of the current into the skin. This arc effect, it seems to me, is what causes the dermatitis. Cases have occurred of raying one side of the face and causing a dermatitis on the opposite side. That could not occur unless the rays act somewhat like an electric current passing from one medium to another. There is no difficulty about working an X-Ray tube in immersion contact with the surface of the body. If care is exercised and the cathode end of the tube is not allowed to touch the material employed for the moist medium, no sparking or puncturing of the tube will occur.

The advantages are many for treating deep-seated diseases, viz.: we get the anode nearer the part affected, thereby utilizing the central rays that some claim are more effective for good. Again, we are less liable to produce dermatitis by long exposure, where needed. The rays have a free passage through the epidermis. The time of each seance can be shortened, as we surely get more rays on to the diseased spot in a given time. A better vibratory effect is obtained, same as in high frequency currents used with moist contact. There is more or less heat, due probably to the intense oscillation of the cathode rays within the tube.

But we learn by making an immersion contact of an X-Ray tube with the bulb of a thermometer that the amount of rise in temperature during the period of an X-Ray seance is only a few degrees above the temperature of the room. This heat may be a benefit rather than a defect of this mode of administration, by assisting the rays through the skin.

Whether this manner of using X-Rays for deep-seated disease is better than properly applied high frequency vibrations, I am not yet prepared to say.

From the action of my coil in treating deep-seated diseases, pus formation, tuberculosis of the lungs and elsewhere, also various inflammatory conditions, the question arises in my mind thus: May there not be a different rate of vibration needed, or best adapted for different purposes? As, for example, the vibration of X-Rays, (which is far beyond that of light) will cure lupus, eczema and other skin diseases in less time than the ultra violet rays will do it. There is a vibration to high frequency currents that, with proper technique, will enter the tissues and cure certain processes and inflammations quicker than the static wave-current or X-Rays. The mode of administration must have something to do with the result, the same as ultra violet rays traverse a dehaematised tissue more readily than when it is filled with blood. The rate of vibration, it seems to me, is everything.

These suggestions are worthy of careful investigation as to their truth or falsity. I do not advance them in an empirical manner; but as they seem to explain some of the results I have obtained from the use of them all, many times repeated, according as, in my judgment, the one or the other was best for different cases.

The makers of my coil offer physicians one mode of using a current of high frequency, which they name "Thermo-Faradic."

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It is a modification of the D'Arsonval

method, and it has been very useful in my practice. I am informed that Mr. Kinraide, under whose patents this coil is made, says that with this modification there are more waves set up by the current than by any other, that we get a certain amount of molecular massage not obtained from any other source; that with this combination we get a heat effect that is beneficial and not obtained from any other way. In D'Arsonval's researches, however, he notes the presence of this heat effect. The manufacturers of the coil believe that it is the combination of the chemical effect of the high frequency current, the heating effect, and the molecular massage, that produces the beneficial changes in the tissue.

It seems to me more probable that the improved local metabolism, the absorption, the destruction of bacteria and the elimination we get, as results from high frequency administration in deep-seated diseases, is the effect of vibration alone. The more vibration we create within the tissues for certain cases, the greater is the result and benefit to the patient. The heat and chemical products may be an auxiliary aid and benefit. The intense vibration is what we want most of all. The more we shorten the waves and increase the vibration, the better effect we get therapeutically. With the Thermo-Faradic current from the coil, we are sure to get the heat if not the chemical products, into the tissue. When we discharge Leyden jars or any other condensers to produce electrical oscillations, the energy is dissipated into heat and has to go somewhere. If we have a good moist contact for the electrodes, a large part of the heat undoubtedly passes into the patient. Otherwise it piles up on the surface and we burn or blister the skin.

The nearer we approach to the vibrations of light, with our apparatus for high frequency currents, the closer we are getting to Nature's method for the destruction of bacteria and septic processes, for where do we find a germicide that will equal sunlight, the bactericidal effects of which have been extensively studied and approved? "The action of the frequencies of light vibration,—or light without heat,—has been tested repeatedly and verified, for the destruction of micro-organisms without the body; but bacteria within the living body, light has not been as successful in killing, but the reaction thereby established in the tissues seems to enable them to withstand the attacks better, or render the tissue an unfit place for the bacteria to flourish." The above are the conclusions of Bernard and Morgan, from their study of the effects of the arc light upon bacteria.

The experiments with sunlight have been summarized as follows: "Everything within the radium of sunlight is purified, every object it penetrates is disinfected and every form of germ life is either destroyed or their development arrested by the solar energy."

Margaret A. Cleaves, M. D., in her interesting work on "Light Energy,," quotes the London *Lancet,* showing that even mechanical vibration from the stroke of an engine had the effect to destroy bacteria left for four days in the engine room. If such coarse vibrations will kill bacteria, what might we expect when we devise a way to "let daylight through the body," as it were? That is what we approximate when we apply the high frequency current. The intense vibration supplied by the Jackson Coil is as near to sunlight vibration as any mechanical means yet furnished us.

In my judgment, this should be the aim of manufacturers of high frequency apparatus, to give us machines that will let vibrations equal to sunlight into the suffering body. Then physicians will be able to combat pathological conditions caused by micro-organisms more successfully than by any other mode of treatment.

Whether this theory is correct or not, I have demonstrated the value of the most intense vibrations possible to obtain by high frequency currents, in the treatment of metastatic abscesses, tubercular ulcers, empyema of the frontal sinus, tuberculosis of the lungs, sciatica, neuralgia, inflammations of the spinal cord and morbid processes and congestions. In all, the current had to go below the epidermis, otherwise no beneficial effect could have been obtained. The cases have been treated with vacuum electrodes in some instances, but chiefly with the Thermo-Feradic current.

In the latter case, I use moist, spongiopilene electrodes on the skin, and metal for internal administration to moist mucous surfaces. With either, the patient gets no unpleasant sensation.

I have selected a few of the cases for more detailed description as to technique and results from the treatment, as follows:

First.—This case is that of a man I attended through a severe typhoid fever. He came to me later with metastatic abscesses of the forearm. One of them I opened and treated in the usual way. To the other I administered the Thermo-Faradic high frequency current. The abscess showed large elevation, the skin was cyanotic with symptoms of early necrosis. I applied the current by means of the moist spongio-pilene electrode, while the patient held an eletric lamp eletrode on one hand as an indicator of the current strength. The skin was changed in color very markedly after the first treatment. The fourth day it was nearly normal in appearance, and the swelling had disappeared to such an extent that the case was discharged well after the seventh treatment. I gave the current daily in about ten minute periods. The area of the affected part seemed to be normal in every respect. The abscess treated with the high frequency current got well before the one that was opened.

Second.—A similar experience was observed in a case of tubercular infection of the cheek of a young girl, predisposed to tuberculosis. The cheek was infected from the removal of a bad tooth, resulting in an abscess. It was prominent on the outside of the cheek, with involvement of the cervical glands, which were considerably enlarged. On this case I used the X-Ray two times, then the high frequency current by means of the Thermo-Faradic and vacuum electrodes. A cure followed after ten treatments, the neck glands returning to their normal condition.

Third.—The most striking instance of rapid recovery by the use of this Thermo-Faradic current was that of a tubercular abscess of the periosteum of the leg of a young woman suffering with tuberculosis of the lungs. In this case there was a very marked stasis, covering an area of about three inches in diameter over the shin. From the dark color and general appearance, I expected it to open in a few days into an ugly ulcer. After ten days of every-other-day treatment, with a moist electrode applied to the spot and the lamp electrode held in the hand, the stasis disappeared. The color of the skin became the same as any nearby part, so that it was difficult to say what portion of the leg had been affected. I am now treating her for tuberculosis of the lungs.

Fourth.—I find that scrofula glands are reduced promptly by high frequency administration. Only a few treatments are required to arrest pus formation, if the Thermo-Faradic current is used for ten to fifteen minutes daily, or every other day. A case under treatment now, which bids fair to make a perfect recovery, illustrates the arrest of pus formation by this current under very difficult abscess. It is a case of empyema of the frontal sinus.

It exhibited, at first, much swelling over the eye and about the temple, with extreme tenderness to pressure. The patient was unable to rest at night. He could not lie on that side without great pain. There was some discoloration about the affected part and the eyelid. After the fourth treatment, the pain ceased and he was able to rest at night when lying on that side, which was his favorite side for sleeping. He has no trouble in that respect now, and there is but little pain under pressure. The swelling is nearly gone. I am very positive that he will make a good recovery. Another similar enlargement over the right malar bone of a young lady, in which the swelling extended well over the temple, was reduced to normal condition after ten treatments with the Thermo-Faradic current.

Fifth.—Various cases of inflammation have yielded to this high frequency current in my practice; more, in fact, than by any other mode of electrical administration. In my judgment, the low form of inflammation that takes place in cases of interstitial nephritis can unquestionably be stopped by the use of high frequency currents properly applied. Several cases of acute Bright's disease have been brought to complete recovery by its daily use for a few weeks.

The low form of inflammation in the spinal cord, that so frequently occurs in these days of high tension civilization, commonly called degeneration of the cord, but of many names and varieties, are all curable, so far as my experience goes, if we can reach them in their early stage with this Thermo-Faradic current.

This opinion is based upon the cases I have treated. Some of them had advanced to a marked paralysis and yet recovered.

In every case but one, the improvement was sufficient to enable them to attend to business, for which they were incapacitated before treatment. There is no doubt in my mind that all such cases commence with a low form of inflammation, such as we see in alcoholic cases, multiple neuritis, etc.

Under high frequency and static brush administration, my patients soon show signs of improvement. They cease to complain of the "neuralgic" lightning spot pains and spinal tenderness. The co-ordination improves. They walk more steadily, dress, and execute delicate operations with the hands, where affected. The numbness lessens, the patients stand with the eyes closed with less swaying. They turn around without the constant visual attention to the feet. Therefore, it seems to me, if only a fair percentage of these cases fully recover, the treatment is as legitimate as any other. It is certainly far more rapid and successful than any I have obtained by other modes of treatment.

Sixth.—The success I have had with the use of vacuum electrodes in conjunction with X-Rays, for eczema of the anus and elsewhere, leads me to believe that this method of treatment for such cases is superior to X-Rays alone, or to any treatment by lotion, ointments and other application. The numerous failures that have been reported in treating skin diseases with X-Rays are due, in my judgment, to over-treatment, weakening the skin tissues by the X-Rays. My plan is moderate and judicious use of the X-Rays, dependent on my judgment of each individual case. I then apply the vacuum electrode between X-Ray treatments. I use the fine discharge from the secondary of the auxiliary of the coil. This gives a beautiful, mild vibration from the vacuum electrodes. It must emit considerable violet light and some chemical effect that is beneficial in a cosmetic and metabolic way. The thinning out of the thickened skin and return to normal appearance is remarkable.

I have not had a single failure since adopting this method of treating eczema and other skin diseases, where the patient remained long enough to expect a cure.

Seventh.—I have now under treatment several cases of tuberculosis of the lungs. They are showing very marked improvement; more so than by X-Rays alone. I do not feel justified from the number of cases and the progress thus far made, in expressing a decided opinion regarding ultimate, full recovery. Still, the improvement in each case is as promising as I anticipated.

My method of administering the high frequency current for the lungs is to apply to the front and back of the chest, also to both sides, a moist spongio-pilene pad of considerable area, say four by six inches. Thus, the patient is in the circuit of the Thermo-Faradic current. The intense vibrations therefrom must reach the lung tissue and prove destructive to the tubercular bacilli.

I believe I obtain better X-Ray results for such cases when I use the X-Rays at a distance through a moist medium in contact with the surface of the chest. To make this moist contact, I use a piece of chamois skin, thoroughly saturated with water, laid on the skin in close contact. Up to the present time I have not had a sign of dermatitis, and I do not believe it is possible to get a burn when the X-Rays are thus administered, because the moisture prevents the drying action of the rays upon the epidermis and helps to carry the X-Rays through the skin.

Eighth.—I am led to hope that with high frequency currents we have a means of clearing up brain-clots—especially if of recent origin where the case has not advanced to permanent paralysis—that is more than promising.

A hemiplegic lady patient of mine was unable to walk or even stand without aid. I had her brought to my office, and commenced the administration of the Thermo-Faradic current ten days after the apoplexy, before the clot could have changed much.

I did not use the current but five or six times, as I was called away for ten days. On my return, I found the woman walking about the house without assistance. Within a month, she was taking an active part in a social function of the family.

In this connection, speaking of hæmorrhages from weakened blood vessels, I wish to call attention to another case that has come under my care and which seems worthy of notice. The patient is a woman, past middle life, who for nearly three years has been afflicted with recurrent hæmorrhages of the retina in both eyes. She was under treatment by an oculist before coming to me, but was growing gradually worse, and as she had been led to believe, with no hope of recovery. When examined by me, she was nearly blind in one eye. She could "tell daylight from darkness," as she expressed it. Wtih the other eye, she was unable to recognize friends' faces upon the street. The woman was thoroughly discouraged and anticipated total blindness in a short time at the rate of progress the trouble was then making.

As I had been for several years the physician of the family, I advised her to let me try the high frequency electricity. It seemed probable to me that the low inflammation present might have had a weakening effect upon the blood vessels. If so, the use of an eye vacuum electrode might improve the metabolism and thereby prevent further hæmorrhages, also strengthen the blood vessels. Since using the current, now over five months, she has not had a recurrence of the hæmorrhages, and her sight has improved wonderfully. In fact, the eye that was blind

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to objects is now the better of the two. She goes about alone in the evening, something she has not been able to do for two years. She can distinguish faces, read the signs as she walks the street, see wall pictures and objects about my office, and can read coarse print. About one month after commencing treatment, she asked me to guess what she had been doing that day. Before I could answer, she exclaimed, "Hemming some towels!" This she did with some aid in threading the needle. She can thread the needle now herself. She has no pain. The world looks better to her in every way. This is evident by her hopeful, cheerful manner since she began to get the effect of the current that cheeers and improves every mental condition.

Ninth.—I have under treatment at the present time several cases of deep-seated cancerous growths. I am using the X-Ray tube in immersion contact on all of these cases. The results are very gratifying. I saturate a piece of chamois skin thoroughly with warm water. This is laid over the part to be treated and the X-Ray tube placed in contact with it. I use a large tube and press it well into the tissue. It can be changed about from place to place to avoid heating one part too much. Either chamois skin or surgeon's cotton will serve for the immersion media.

The chief point is to have the medium well wet so it will set closely to the skin. I am inclined to the opinion that a normal saline solution is better than plain water.

I will call attention to only one case now under treatment by this method, because this case illustrates the good results very markedly, and because it has been rayed in the usual way in Boston and elsewhere by other physicians before coming to me. The only apparent results from those treatments was an X-Ray burn. The growth had increased. The case originally was a cancer of the breast now of six years' standing. It had been operated on. The sequence was a growth and hardening in the muscles of the left shoulder and neck.

The whole shoulder and breast were involved. The principal trouble was a large growth that showed on the superior and posterior aspect of the shoulder. The centre of the growth was a hard knob, quite blue in color. It was about as large as half of a hen's egg cut lengthwise. The cervical glands and sternocleido-mastoid muscle of the left side were all involved, giving the usual stiff, boardy condition.

The patient, a woman, was X-Rayed in Boston by a physician who commenced treatment in Auguust, 1904. Treatment was given for seven weeks, got a burn and stopped for one month. He then rayed it again for six weeks longer, twice a week. The arm began swelling and the skin sloughed from the shoulder. In February, 1905, violet light was tried, and eight X-Ray treatments were given by another physician. No apparent result.

March 20th, the woman consulted me for treatment. I began that day to use the X-Rays with the tube in immersion contact, as the case was entirely inoperable. I applied the tube to the bunch on the shoulder and gave every other day treatments for five minutes at each sitting. I also used the Thermo-Faradic current on alternate days until April 10th. After that date, I used the immersed X-Ray tube alone, every other day, for five to eight minutes. Got no burn, only a slight erythema of about two inches in diameter.

The patient then went home; returned for treatment on the 18th of May. The bunch on the shoulder was then much improved, the glandular enlargements had disappeared. At the present time, June 10th, the blue knob has disappeared entirely. The shoulder, to external appearance, is of normal size, color and condition. The patient complains of a "drawn feeling" in the sterno-mastoid muscle, and there is yet some œdema of the arm.

In my judgment, the case is practically cured. I am of the opinion that if I had X-Rayed this case in the usual way with the powerful Crookes tube which I used, I should have had a bad X-Ray burn on my hands, owing to the condition of the tissue when I took the case, from the previous air-space treatment and the former burns.

In conclusion, I would say that the principal point to be considered in treating a case with the tube in immersion contact is the following: How much X-Raying with the tube in close contact will the tissues bear without over-cellular stimulation? There is no way to determine this except by the united, intelligent effort of competent X-Ray workers, using the tube in that manner on deep-seated malignant growths. The time of each seance, the medium to be used to excite the tube, the quantity and quality of the rays, must be carefully noted and the results watched with judgment, as there is no doubt that we get more X-Rays into the tissue by immersion than by air contact.

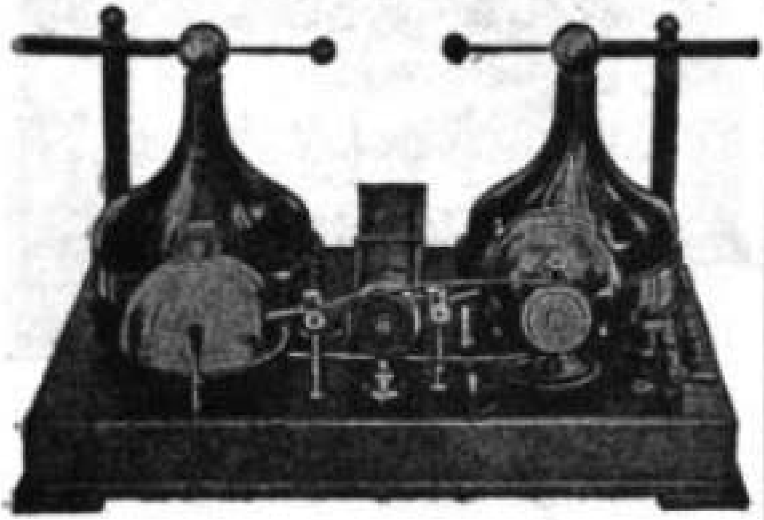
Therefore, the one gives no basis for judging the other and its outcome.

I hope physicians will take up this subject and determine its true value by practical tests. Up to the present time it has proved of decided value to me in treating inoperable, malignant growths deeply located in the tissues of organs of the body. A case of cancer of the rectum, now under treatment through the abdomen, does not show any disturbance of the epidermis, not even the customary tanning, although if the tube had been put as close to the dry skin as with this immersion method, a severe burn must have resulted from the number of treatments given. I do not believe it is possible to get a dermatitis from the same number of treatments by immersion as through air, at short distance. In fact, I doubt if it is possible to get a burn at all with the tube properly immersed.

Physicians!

EQUIP YOUR OFFICE FOR

Electric X-RAY Treatment.



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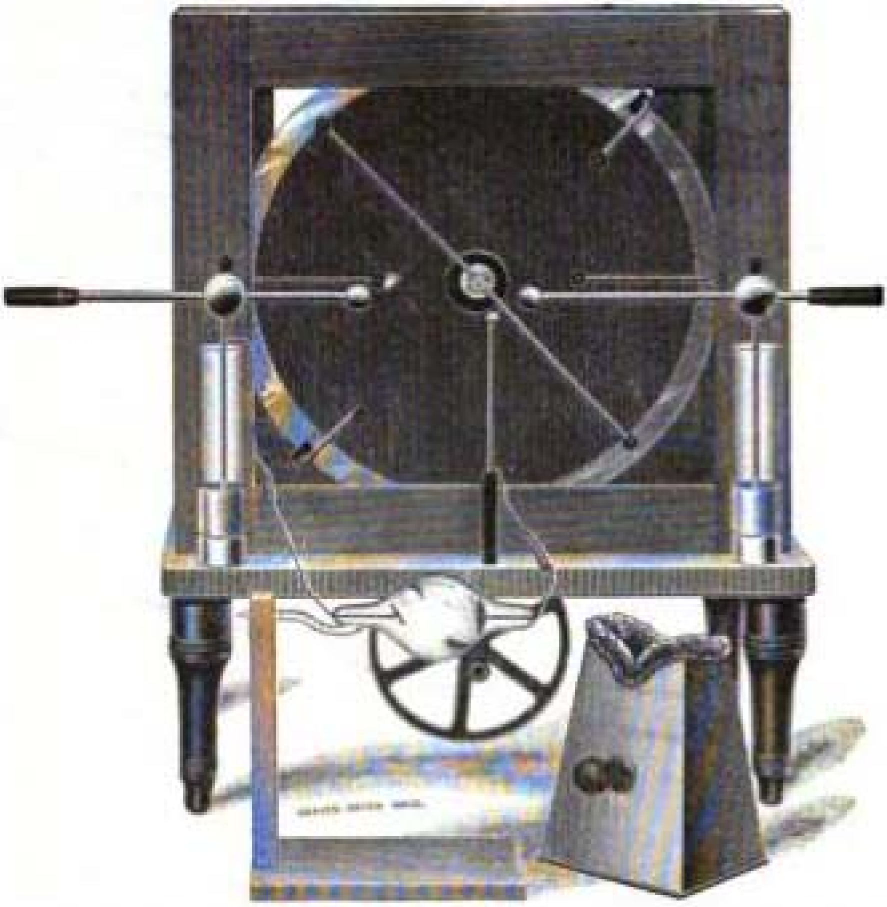
THE STRONG POINTS of this apparatus are: Shortness of exposure, impossibility of a breakdown, immense quantity of current, absolute steadiness of Ray, great convenience in use, uneffected by weather, practically indestructible, Static effects with new vacuum electrodes.

Send for Illustrated Booklet, Free.

SWETT & LEWIS CO.
18C Boylston St., BOSTON, MASS.



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$65.00

CATALOGUE "K."

Static Machine, Two Tubes, Tube Stand, 6x6 Fluoroscope, Electrodes for Therapeutical Work, $9.00 per Set.

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18 BOYLSTON STREET - - - BOSTON

SEND FOR NEW BULLETIN

The World
35 PARK ROW.
Branch Office, 1267 Broadway,
New York.

April 3rd 1878

My Dear Mr Edison

Enclosed I send you a note of invitation from Mr Keely written over a month ago. I also send Mr Knight's report on the motor. Mr Knight is an idiot as you will possibly see and as I intimated before his report was published. I saw every bolt taken out of every part of the machine yesterday and have verified all the drawings of the machine. The device was taken apart to make some alterations and we can go any day next week that will be convenient to you. I hope very much that you will be able to spare a day. Enclosed I also send the account of our last visit to your shop. I dont know whether you have seen it. Please let me know as soon as you can that you have not changed your determination to go to Philadelphia

Very Truly Yours
Jno Gilmer Speed

[ENCLOSURE]

Chas. B. Collier,
ATTORNEY AT LAW,
702 Chestnut Street,

Philadelphia, Feb 25th 1878

Mr. Thos A. Edison
Menlo Park New Jersey
Dear Sir

You have doubtless heard of my invention known extensively through the newspapers as the "Keely Motor".

My discovery consists in obtaining from air & water through vibratory action an elastic substance of great energy & capable, through the same influences which produce it, of absorbtion in water, giving a vacuum.

Thinking that perhaps you may, from your long experiments & extended knowledge in vibratory forces, be interested in seeing the operation of my invention I take the liberty of extending to you an invitation to visit my place at some time that may be convenient to you where I shall take pleasure in showing you ~~the~~ my machine and operating it for you.

Should my invitation be accepted will thank you to address me at my house #2021 Ridge Ave — this City — stating the time when I may look for you.

Very Respy Yours
John W Keely

[ENCLOSURE]

KEELY MOTOR COMPANY,
Office, 702 Chestnut Street,
[PRESS BUILDING.]
PHILADELPHIA.

file miscellaneous

Mr Thos. A. Edison
Menlo Park
New Jersey.

BOYD ELIOT,
MECHANICAL ENGINEER.
Expert in U. S. Courts,
SOLICITOR OF PATENTS.
N. Y.

REMOVED TO 44 EAST FOURTEENTH STREET,
(UNION SQUARE.)

New York, Aug. 29th 1878

Thos A. Edison
Menlo Park N. J.

Dear Sir

Mr Collier of Phila the atty for Keely wished me to ask when you could go to see the Motor which is now working very well hence the telegrams I called at the World office and Mr Speed was reported as on his vacation hence I cannot tell Mr Collier or Keely when to be ready.

If you can spare me a few minutes Saturday I will call at Menlo Park if the weather is pleasant &c. I wish to chat a little about a new application of electricity

Boyd Eliot

T. A. EDISON.

11 20 am

2

Menlo Park, N. J., Aug 29 1878

NY 29 Thos A Edison M Park

Can you accompany me to See Keelys motor Saturday

Boyd Eliot
44 East 14th St

14 paid
C Q

T. A. EDISON.

2

Menlo Park, N. J., Aug 29 1878

Boyd Eliot
44 East 14th St
NY

I have promised to go with Mr Speed of the World Call on him

T. A. Edison

15 Collect

1127
G Q

T. A. EDISON. 2 1^{30} Pm

Menlo Park, N. J., Aug 30 1878

NY 30
T A Edison M Park
Mr Speed is away and probably will not return to New York I would be glad to go with you to Keeleys monday if you will go I will take Eleven a m train for Menlo D V Lynch

D
24 paid
at 9

T. A. EDISON. 3

Menlo Park, N. J., Aug 30 1878

D V Lynch
World office NY
Collier just visited me. Keeley only willing to show pressure I will not go until he works an Engine
T A Edison

20 Collect

2 33
9 at

E. H. Johnson Room 28 Tribune Building =
Can I see proof of Review
article early monday morning

T A Edison

Sent Batchelor
Apl 8 Per Hussey

Blank No. 1.

THE WESTERN UNION TELEGRAPH COMPAN

The rules of this Company require that all messages received for transmission, shall be written on the message blank of the Company, under and subject to the conditions printed thereon, which conditions have been agreed to by the sender of the following message.

WILLIAM ORTON, Pres't, } New York.
A. R. BREWER, Sec'y,

Dated Newport Apr. 8th 1878

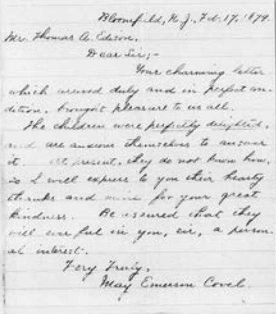
Received at

To Thos A. Edison

They telegraph that
they Cannot be ready
Monday, will get a letter
tomorrow, and will then
Communicate with you

J. G. Speed

19 paid



Bloomfield, N. J. Feb. 17, 1879.

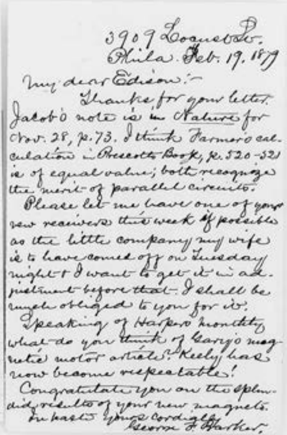
Mr. Thomas A. Edison,

Dear Sir;-

Your charming letter which arrived duly and in perfect condition, brought pleasure to us all.

The children were perfectly delighted, and are anxious themselves to answer it. At present, they do not know how, so I will express to you their hearty thanks and mine for your great kindness. Be assured that they will ever feel in you, sir, a personal interest.

Very truly,
May Emerson Covel



3909 Locust St.
Phila. Feb. 19. 1879

My dear Edison:-

Thanks for your letter. Jacob's note is in *Nature* for Nov. 28, p. 73. I think Farmer's calculation in Prescott's Book, p. 520-521 is of equal value; both recognize the merit of parallel circuits.

Please let me have one of your new receivers this week if possible as the little company my wife is to have comes off on Tuesday night & I want to get it in adjustment before that. I shall be much obliged to you for it.

Speaking of Harper's monthly what do you think of Gary's magnetic motor article? Keely has now become respectable!

Congratulate you on the splendid results of your new magnets.

In haste Yours cordially
George F. Barker.

Sept. 21st. 6

N. D. C. Hodges, Esq.,
Editor, "Science",
47 Lafayette Place, City.

Dear Sir:-

I have your favor of the 18th. inst.

I think that I would very much prefer not to attend the exhibition you speak of, as I have no desire to offer any opinion on Mr. Keely's so called motor. Thanking you very much for your invitation, I remain,

Yours very truly,

T.A.E.
J.

Arc lamp - Tesla Co.

CHAS. B. CARMAN.

General and Commission Dealer in

TIMBER, PILES, DOCK LOGS, &c.

—ALSO—

HEWN OHIO OAK, WHITE AND YELLOW PINE TIMBER.

TELEPHONE, 891 NEW.

44 Broadway, Room 65.

New York, Feb 3 1888

Thomas A Edison Esqr

Dear Sir

Will you please inform me if anything has been done about the Lamps sent you. I am negociating a sale of Bonds and majority of the stock of the Tesla Co to N.Y parties. and if anything can be done with you in regard to manufacturing on a Royalty for your own use the said Lamp - I would like it done by our directors before the Company changes hands therby securing you the right if you want it - please let me know your wishes in the matter

Respt Yours

Wm Carman

We are going to test them
have only just put up Machine pulleys—
& are waiting

ans Feb 7/88

Lab. Employees
John Ott

1896

answered Apr 29/96

[INCORPORATED.]

A. C. SHAW, Business Manager.

THE
Electrical Engineer.

A WEEKLY REVIEW OF THEORETICAL AND APPLIED ELECTRICITY.

Edited by T. Commerford Martin and Joseph Wetzler.

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Send also for our **Catalogue of Electrical Books,** free on application.

New York, 203 Broadway, April 27/96.

Dear Mr. Edison,

I have had a talk with Dr. Wm. J. Morton, the eminent electrotherapist, with regard to his treating Mr. John Ott.

Dr. Morton tells me that he will be only too glad to do what he can for Mr. Ott and hopes to visit the Laboratory some afternoon this week, and at the same time pay his respects to you, to thank you for courtesies extended to him.

Dr Morton seems sanguine that he can help Mr. Ott. With kind regards, I am, Sincerely yours Jos Wetzler.

Answered Apr 10/96

D
1896

Editor: CHARLES W. PRICE.
Associate Editor: STEPHEN L. COLES.

Editorial Rooms
Electrical Review
13 PARK ROW.

X-Ray

New York April 9, 1896

You have Tesla that ought to satisfy you
Edison

Thomas A. Edison, Esq.,
Orange, N. J.

Dear Mr. Edison:-

If you have anything additional on the X ray question, won't you put us on the list so we can get a copy of it and publish in the most widely read electrical paper in the world. Modesty will not permit me to tell you what this paper is, but you know. With regards,

Very sincerely yours,

X-Ray

Form No. 1.

THE WESTERN UNION TELEGRAPH COMPANY.

INCORPORATED

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THOS. T. ECKERT, President and General Manager.

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RECEIVED at ORANGE, N. J. 4/27 189

Dated New York 27

To Thos A Edison

The county medical society of New York cordially invites you to be present this evening academy of Medicine Seventeen West 43 St At demonstration of X rays by Dr Morton.

Answered Apr 21/96

D
1896
X-Ray

"Semper Urgens Altior."

NEW YORK ODONTOLOGICAL SOCIETY.

Incorporated 1867.

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58 West 50th Street.

Meets Third Tuesday of each month at the Academy of Medicine, 17 West 43d Street.

Thos A Edison Esq

Dear Sir,- I know you are sufficiently interested in the X rays to attend the lecture of Dr Morton which is given as the enclosed card Explains

Trusting to see you on the 24th inst I am

Very sincerely yours

W W Walker

I am too deaf to hear Lectures
is there anything I can do
to help Morton, E

Patent

DYER & DRISCOLL.
RICHARD N. DYER
D. H. DRISCOLL
S. O. EDMONDS

LAW OFFICES, SPECIALTY: PATENTS
36 WALL STREET,

No Ans

NEW YORK, January 2, 1896.

Thomas A. Edison, Esq.,
Laboratory,
Orange, N. J.,

Dear Sir:-

We have arranged with Dr. Morton to come to the laboratory Saturday morning for the purpose of repeating the experiments conducted last Tuesday and to experiment with the additional material which you had in course of preparation. We shall be glad if you will see that everything is ready for the experiments, so that Dr. Morton will not be kept waiting.

Yours very truly,

Dyer & Driscoll

O.M. - Patent

File

DYER & DRISCOLL.
RICHARD N. DYER
D. H. DRISCOLL
S. O. EDMONDS

LAW OFFICES, SPECIALTY: PATENTS
36 WALL STREET,

NEW YORK, January 22, 1896.

T. A. Edison, Esq.,
Orange, N. J.,

Dear Sir:-

We beg to inform you that the Commissioner of Patents has reversed the Board of Examiners-in-Chief on your application for process of separating iron and copper pyrites, the claims in the case being allowed just as they were presented.

Yours truly,

Dyer & Driscoll

OFFICE
DR. WILLIAM JAMES MORTON,
NO. 19 EAST 28TH STREET,
CONSULTATION HOURS, [illegible]

NEW YORK CITY, Feb. 20th 1896

My dear Mr. Edison

Would you think it too great an imposition if I asked you to let me have one of your Crookes' tubes? Mr. Tesla said this morning he would certainly make me one and suggested, as he might be delayed, that I send [illegible] to you. I saw it reported that you would be willing to let some few responsible workers have one of your Tubes and I assure you if you can let me have one that I shall be most grateful as I much desire to get down to work in surgery and away from any other form of experimentation.

Yours most sincerely
Wm J. Morton

DR. WILLIAM JAMES MORTON,
No. 19 EAST 28TH STREET,
NEW YORK

Thomas A. Edison Esq.
Newark Laboratory.

By hand of
Dr. Reeves.

Randolph
Say that as soon as I am satisfied with tubes will send Compl.
Edison
file tubes

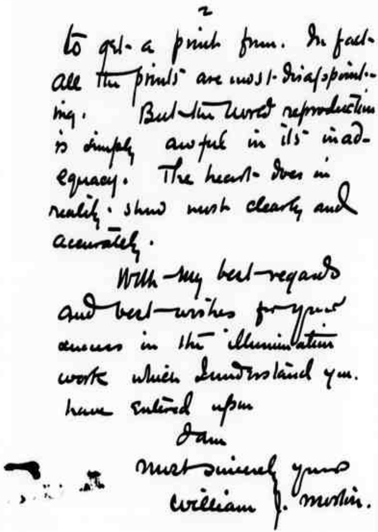
D
1896 X-Ray

OFFICE
DR. WILLIAM JAMES MORTON,
NO. 19 EAST 28TH STREET,
CONSULTATION HOURS, 10-1,

NEW YORK CITY, June 10th 1896

My dear Mr. Edison

I thank you for your kind reference of the N.Y. World people to me and particularly for the remark they attribute to you, namely that I would be most likely to get a successful photograph. The World cut does no justice to a very beautiful negative. Some of these X ray negatives are most ghost-like and very difficult.



2

to get a print from. In fact all the prints are most disappointing. But the word reproduction is simply awful in its inadequacy. The heart does in reality show most clearly and accurately.

With my best regards and best wishes for your success in the illumination work which I understand you have entered upon

I am
most sincerely yours
William J. Morton.

Dr Wm J Morton of NY is the best x ray expert in this Country

answered June 2/96

Pittsburg Penna
June 19/96

Thos. A. Edison Esq
Orange. N.J.

D
1896
X-Ray

My dear Sir

I am in receipt of your esteemed favor of June 16 replying to mine of the 13° for which I thank you and beg to trouble you once more to ask you to give me the name and address of any New York or Eastern physician who is using your X Rays in the treatment of tuberculous or lung diseases Trusting that you may meet with renowned success in the completion of this wonderfull invention and thanking you for your kind consideration in my case I beg to remain

Yours Very truly
Jos Lippincott Vance
P.O. Box 245
Pittsburg, Penna

GENERAL ELECTRIC COMPANY
PRINCIPAL OFFICE
SCHENECTADY, N. Y.

Johnny Keep the description

answered Aug 18/96

August 17, 1896

I have several kinds of alternating apparatus & can rig up to suit almost any kind of coil, ~~one of~~ ~~also~~ ~~Edison~~ yes

Mr. Thos. A. Edison,

Orange,

New Jersey.

Dear Sir:

I visited Lynn on Friday and found that one of our high frequency sets will be ready about the middle of the present week. I gave instructions that it be shipped to you.

so that will work

This high frequency set can only be used with alternating current of between 60 and 125 cycles, and therefore before shipping the same I write to inquire just what kind of an alternating machine you have; what cycles per second it gives and what is the primary voltage.

I can operate the Thompson apparatus from a dead plant

I would also like to know the secondary voltage of the transformers which you may have for operating the above machine. The high frequency apparatus is made for a voltage of 50 or 100.

Kindly drop me a note giving me the above information, and I will see that the apparatus is made to suit your circuit. It may be necessary for us to send you one of our regular transformers to work with the high frequency set.

I found that the 12" inductance coil set is not so far along, but we hope to have one ready in the course of a week. These sets are made to run from storage batteries, giving from 8 to 12 volts, although they can be operated on 110 volts continuous current circuit, through the medium of a motor generator. I saw one of the smaller sets running yesterday, giving a perfect torrent of 6" sparks, a good thick discharge, the current being supplied by four-cell~~ed~~ small secondary battery.

I have asked Mr. Meadowcroft to send you one of our new Thomson Universal tubes, such as we use in connection with the high frequency apparatus, and which we think gives very fine results. I will be glad to have your opinion or criticism on this. I send you, under another cover, a brief description of these high frequency sets, together with instructions for operation, which we are preparing to have printed.

It will give us pleasure to send a man who is thoroughly acquainted with the apparatus to your Laboratory to assist in setting it up, if you so desire.

Yours truly,

E.W. Rice Jr.

Third Vice President

K

Signed in dictator's absence.)

[ATTACHMENT]

DIRECTIONS FOR INSTALLING & OPERATING THOMSON HIGH FREQUENCY TRANSFORMER FORM B, CLASS 5, FOR X RAY WORK

GENERAL DESCRIPTION:

The Thomson X-Ray Transformer as seen on Photo. #2501 consists of

1) the following parts all contained in or on a mahogany box shown in centre of photo.
   - Low Frequency transformer,
   - High frequency transformer
   - Condenser,
   - Spark gap,
   - 2 discharge terminals,
   - 2 discharge stands,
   - Tray for box to stand in.

2) An adjustable regulator,- shown at the left.

3) An alt. current motor with air blast attachment,- seen at the right.

4) One tube stands,- in front.

5) " Thomson Universal tube (held on stand)

6) " fluoroscope,- not shown.

SETTING UP:

Open lid of mahogany box, remove block which lies between condenser and high frequency transformer, and lid. Fill the apparatus with Transil oil #3 (a 5 gal. can of which is enclosed in shipment) to within one inch of the lid, and the hard rubber sockets in which the discharge terminals fit are well covered. Be careful not to get any foreign matter into the oil. Screw down the lid. Insert spark gap and discharge terminals in their re-

[ATTACHMENT]

spective sockets, connect air blast to spark gap. Before starting motor, see that the air blast is properly lubricated. An oil cup screwed to front plate is provided for this purpose. Make all wire connections as shown on sketch 2216, allowing for a max. of 10 amp. for 52 volts and 5 amp. for 104 volt circuits.

The regulator has 9 stops, 4 of which are dead. The working stops are marked respectively 1, 2, 3, 4, 5, in starting from the left. The spark obtainable is smallest with switch on stop #1, and maximum with #5. With a normal e.m.f. and normal tube, stop #2 will be found right. No. 5 should only be used in case of low line voltage or in connection with a tube whose vacuum is very high. Place your switch for installing apparatus conveniently near regulator, and never allow the tube to be excited unless it is needed for work.

Sk. No. 2179 gives the internal connections of the parts shown under 1, and Sketch 2216 shows the manner in which the Thomson X-ray transformer is to be connected, in connection with its auxiliary apparatus to the supply. The transformer proper may be used either on 52 volts or 104 volt circuits. Lines marked in full on connection board (Sk.2179) show the secondary connected in multiple for 52 volts. By removing the strips and placing them on top of each other as shown in dotted lines, the apparatus is connected for 104 volts. Frequency may vary from 60 to 125 cycles.
The alt. cur. motor with air blast and regulator cannot be used

on any other frequency or voltage than the one for which they were originally ordered.

OPERATING:

The discharge terminals allow the operator to form an opinion of the E.M.F. at his disposal and indirectly of the degree of vacuum in his tube. If the two balls are set, at say, three inches apart, they will serve as a safety valve, allowing no greater e.m.f. to excite the tube than would jump the 3 inches of air. The discharge stands are connected with the Thomson Universal tube by two small copper wires about #28 A.G. (.013). Care should be taken not to have the wire touch any part of the glass to prevent puncture; the discharge stands are kept about 1/4 to 1/2 apart from the discharge terminals interposing two air gaps between the tube and the exciting source.

By so doing, much of the unnecessary heating of tube is avoided. The spark in spark gap is adjusted by means of protruding rubber handle. The maximum sparking distance is one quarter of an inch; the balls should never be permitted to short circuit. Start with a small spark and increase distance gradually but stop before spark becomes unsteady. The metal sockets of the spark gap must never be touched with the hands when current is flowing through apparatus, as by so doing injurious shocks may be obtained. All metal parts connected therewith are carefully insulated.

[ATTACHMENT]

The Thomson Universal tube can be fastened on the stand either by pinching stem in cork lined clamp (shown at the base) or by attaching the tube to the support provided with metal diaphragm by rubber bands (as shown on photo.) The latter prevents any interference of rays from cathode cups and gives a sharp well-defined shadow.

The X-rays are produced at the platinum wedge g. (Sk. 2216) and in the position shown are best adapted for photographic work while for fluoroscopic work, the platinum wedge should face operator, as shown on photo. 2501.

[ATTACHMENT]

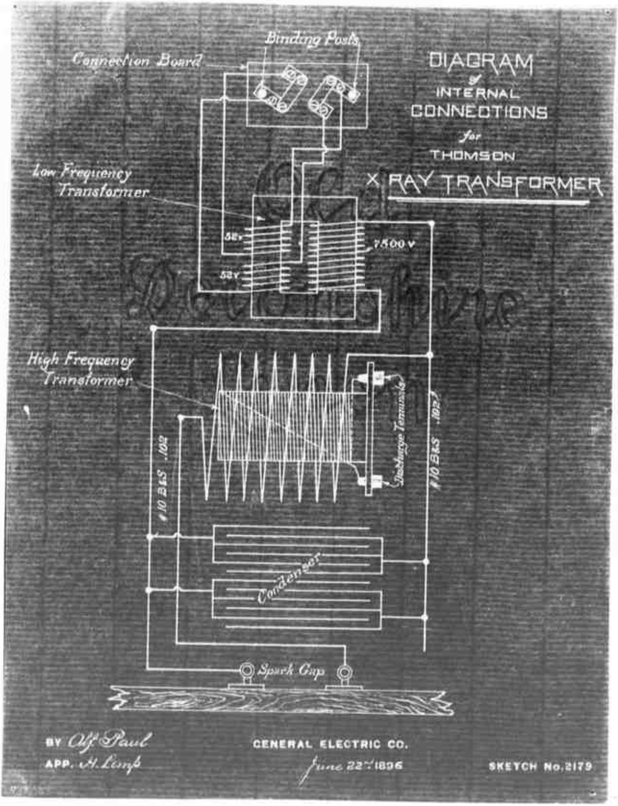


DIAGRAM
of
INTERNAL
CONNECTIONS
for
THOMSON
X RAY TRANSFORMER
Binding Posts
Connection Board
Low Frequency Transformer
52v
52v
7500 V
High Frequency Transformer
Discharge Terminals
#10 B&S .102
#10 B&S .102
Condenser
Spark Gap
BY Alf. Paul
APP. H. Lemp
GENERAL ELECTRIC CO.
June 22nd 1896
SKETCH No. 2179

[ATTACHMENT]

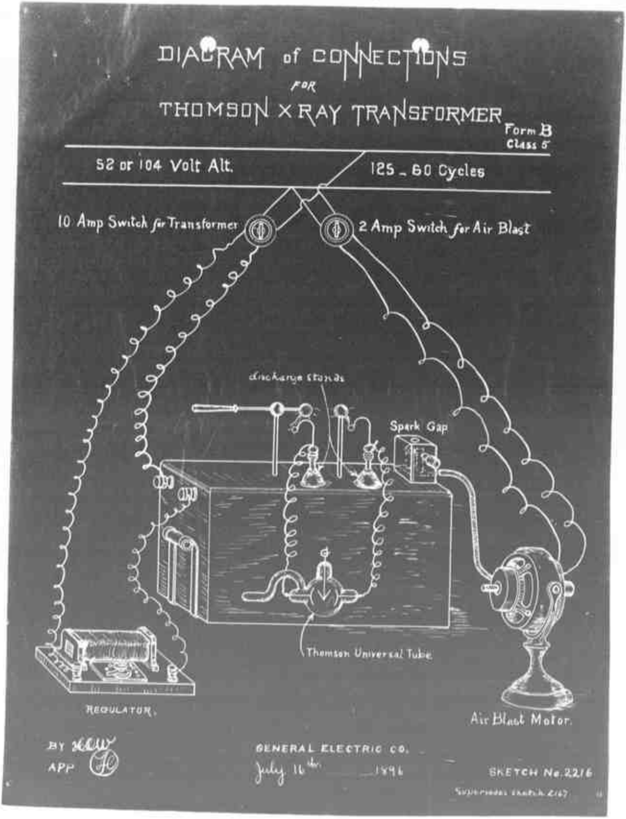


DIAGRAM of CONNECTIONS
FOR
THOMSON X RAY TRANSFORMER
Form B
Class 5
52 or 104 Volt Alt.
125 _ 60 Cycles
10 Amp Switch for Transformer
2 Amp Switch for Air Blast
discharge stands
Spark Gap
Thomson Universal Tube
REGULATOR.
Air Blast Motor.
BY
APP
GENERAL ELECTRIC CO.
July 16th 1896
SKETCH No. 2216
Supersedes Sketch 2167

X-Ray

Edison Decorative and Miniature
Lamp Department.
Harrison, N. J.

/

August 18/96.

Thomas A. Edison, Esq.,
Orange, N. J.

Dear Sir:--

In accordance with a request of Mr. Edward W. Rice, Third Vice President, I take pleasure in sending you herewith one of the latest forms of the Thomson Universal double-focus tube with adjustable vacuum. Although it is probably superfluous, I send you copy of the directions which we send out with these adjustable vacuum tubes.

Yours very truly,
Wm H Meadowcroft
Secty.

[ENCLOSURE]

Edison Decorative and Miniature
Lamp Department.
Harrison, N.J.

DIRECTIONS FOR USING
THE THOMSON UNIVERSAL TUBE WITH ADJUSTABLE VACUUM.

This form of vacuum tube has a small extension tube affixed containing a chemical substance, which, when heated, will throw out more or less vapor. The tubes when finished by us are exhausted up to the usual degree of vacuum and when received by the customer should be in condition for actual use just as if there were no extension tubes affixed.

After the tube has been used for some time the degree of vacuum increases so that it becomes less fluorescent, and does not give as white a screen in the fluoroscope. When the tube has arrived at this condition it is time to work the adjustable vacuum feature.

This is done by applying heat to the small auxiliary tube containing the chemical substance. It is best not to bring a flame in direct contact with this small tube as the glass may crack when cooling. The best way is to place one of the small kerosene night lamps under the small tube, so that the top of the lamp chimney is anywhere from one to two inches below the small auxiliary tube. The wick of the kerosene lamp can be raised or lowered, so as to produce more or less heat, as required by the necessities of the case.

When the vacuum has become so high that the heat is applied as above directed it will be noticed that in a few seconds the darkness of the bulb disappears, the bright fluorescence is once more present and an abundance of X-Rays will be manifested by the bright appearance of a fluorescent screen.

If too great a heat is applied, the chemical substance will throw out too much vapor and the interior of the bulb will become quite blue. If this condition is reached, the kerosene lamp should be removed and after a few minutes running, the vacuum tube will resume its normal brilliant fluorescent appearance.

This vacuum adjustable tube can be worked for a long time in the above manner, and if the bulb should not be injured or destroyed, the small auxiliary tube can be renewed at any time.

[ENCLOSURE]

**Edison Decorative and Miniature
Lamp Department.
Harrison, N.J.**

DIRECTIONS FOR USING
THE THOMSON UNIVERSAL TUBE WITH ADJUSTABLE VACUUM.

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When the vacuum has become so high that the heat is applied as above directed it will be noticed that in a few seconds the darkness of the bulb disappears, the bright fluorescence is once more present and an abundance of X-Rays will be manifested by the bright appearance of a fluorescence screen.

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This vacuum adjustable tube can be worked for a long time in the above manner, and if the bulb should not be injured or destroyed, the small auxiliary tube can be renewed at any time.

[CA. OCTOBER 1896]

DIRECTIONS FOR INSTALLING AND OPERATING

THOMSON INDUCTORIUM

Class E - Form 12.

--0--

GENERAL DESCRIPTION:

The Thomson Inductorium is an exciter of the type generally known as the Ruhmkorff Coil with certain specific modifications in construction. The high potential discharges are obtained by a make and break of current in primary, having a condenser connected in multiple with the breaker.

The function of both the condenser and the water break (which are used in connection with the Thomson Inductorium) is to secure a very rapid interruption of the primary circuit, hence a long spark is obtained even with a moderate sized coil.

The set consists of,-

1) Induction coil proper with spark terminals,
    2 jar condensers,
    2 discharge stands,- the whole is contained in a mahogany box, filled with insulating oil and sets in a japan tray.
    12 gals. of Transil oil #3, (Boxed)

2) A 5 microf. condenser with adjustable capacity.

3) A 6 volt electric motor with rheostat and a contact breaker connected thereto by a belt.

4) A tube stand for holding the single focusing tube.

5) A single focusing tube

6) A fluoroscope.

7) 1 Ten-amp. S.P. Ratchet & 1 dble. "baby" switch (Cat. 71027)

Photo. #3571 shows the various parts herewith enumerated.

The outfit is best run either from primary or secondary batteries, which are provided by the purchaser to suit his own convenience. To obtain a full 12" spark, a battery of 6 cells giving 12 volts and 10 amperes will be required. The motor driving the contact breaker requires 6 volts 10 amperes, in addition to the above.

****

SETTING UP:

Sk. [illegible] shows how to unpack the Inductorium.

Unscrew the lid, remove the locking strips which hold the transverse strips, supports for connection sockets, and move the latter out of the way as shown on the left hand side of the sketch. Then withdraw the wooden wedges, marked "2" and the wooden separaters, marked "1" "3" & "4". Replace again the connection boards and locking strips, and fill the box with Transil oil #3, a can of which accompanies each shipment, until the top of central insulation is just flooded. Screw the cover in place, insert the discharge terminals and set the whole in the japan tray. Make the wire connections as shown on Sk. #2295, using no smaller wire than #12 A.G. (.08") with the exception of the connections between the Inductorium and the single focusing tube, which are of #20 A.G. The 6 volt motor is next set up, and connected by a 3/16" twisted belt to the contact breaker. The motor works best when running at 1500 revolutions; the speed may, however, be varied by turning the rheostat handle to the left, when the speed will decrease, or to the right in the direction of arrow, when it will increase.

The brushes on motor should not bear too strongly upon the commutator and the latter should be slightly lubricated. The brush yoke should be shifted into a position in which there is no sparking. It is set and locked in this condition during testing. See that the oil cups are filled with lubricating oil. The contact breaker is to be filled with pure water (rain water or melted ice being preferable) to the top of the shaft. Adjust the split brush to bear evenly and firmly on the copper discs. Do this with the cover removed and the motor standing still. See that the shaft is lubricated with oil before you start. The woven wire brush is to bear lightly on collector ring while the slotted brush is to bear on the copper discs revolving in the water. There are two discs supplied with the 12" Inductorium (only one with the 8") and upon removing or adjusting them, care should be taken to see that the insulating segments of both discs are in line with each other, that is to say, both wheels must break the current at the same time. A flat portion on the shaft facilitates this. Connect the batteries as shown.

For normal work of the tube, 5 cells will be sufficient. For extra large tubes or tubes with a high vacuum, the 6 cells may be required. The loose connection Y shown on diagram, allows the coil to be connected either with 1, 2, 4, or 6 cells, while the motor should be constantly connected with the three cells.

Place the discharge stand on Inductorium and connect them to the single focusing tube by #29 (.011") wire. Take care that the wire does not touch the glass of the tube at any place. The jar condensers are set on top of terminals and connected by chain as shown.

....

OPERATING:

Start your motor by closing switch 1, and connect the terminal "T" to S-1. Adjust the discharge terminals to be about 4" apart and close your switch S-2. If the polarity of the Inductorium is correct as shown on diagram, the tube will show but little fluorescence, but will give a strong discharge of Roentgen rays. The anode, shown in sketch as a flat star-shaped platinum disc, should be the source of the Roentgen rays. If the tube should show strong fluorescence with very little rays, it is probable that the polarity should be reversed. To ascertain this point definitely, observe the tube through a fluoroscope, holding a metal strip in front of it (a table knife will do) turning the same until its narrow edge throws a shadow. The plane of the blade must then lie in line with the source of rays. If it points towards the starshaped anode, the connection is correct.

If it points, however, to the aluminum cap, the connection should be reversed. This is best done at the primary of the Inductorium marked "P".

* * *

GENERAL HINTS:

It has been found by experience that the tube will work the best if subjected to periodical discharges of some large capacity rather than to continuous discharges of small capacity. For this reason, connections shown in diagram using jar condensers is the best. The flow of discharges through the tube is easily regulated by the spark gap, that is to say, by the distance the spark will be made to jump to the discharge stands from the discharge terminals. The best capacity of condenser seems to be by using all stops, although less capacity will be desirable with small tubes and smaller number of cells. Experience will teach which is the best.

It is well to frequently change the water in contact breaker especially if the Inductorium is worked a good deal. A small cock allows the oil to be drawn off. Two extra break wheels and brush ~~is~~ are furnished with each contact breaker which may be readily put in place of the old ones by loosening the set screws. The break wheel will be the only part in the outfit which is open to wear but can easily be kept in good condition by occasional removing and truing up.

* * *

For photographic work, the single focus tube is generally turned downwards, the star-shaped anode being parallel with the object to be shadowgraphed. The plate holder is placed on the base of the tube stand, the object to be shadowgraphed is placed in close contact with the latter.

For fluoroscopic work, the tube is turned up, so that the anode faces the operator, and the object is examined through the fluoroscope. The action of the tube can be illustrated by imagining the cathode rays emanating from the aluminum cup, and then impinging upon the platinum anode where they set up the "Roentgen" or "X" rays. In this assumption, the cathode rays are indicated in the sketch by dotted lines, while the Roentgen rays are shown by dashed lines. The time of exposure will depend upon the distance of the sensitive plate from the anode, upon the intensity of the rays, upon the thickness of the object to be shadowgraphed, and to some extent upon the quality of the plate used. There are some special plates made with double and triple emulsions, which are the most sensitive for this work, and may be obtained by applying to the leading dealers. Experience will familiarize one with the proper conditions.

To photograph a hand at about 8" from the tube, for example, the exposure of one minute ought to be sufficient.

Separate directions are furnished for the operation with adjustable vacuum tubes. These directions may be briefly summarized as follows:

Frequent discharges of the tube will cause the vacuum to rise, so that the spark will no longer pass freely through the tube. This condition is indicated by the sparks passing over the exterior of the tube. To lower the vacuum to the proper working condition, use a flame and heat the small tube attached to the single focus tube proper, taking care to apply the heat gradually. In many cases, an ordinary match will be sufficient. The tube, when working properly, is filled with a moderate fluorescence, while the platinum anode is at a red glow. The tube may be maintained running for hours in this condition without requiring any readjustment, the heat radiated from the anode being sufficient to maintain the vacuum.

[ENCLOSURE]

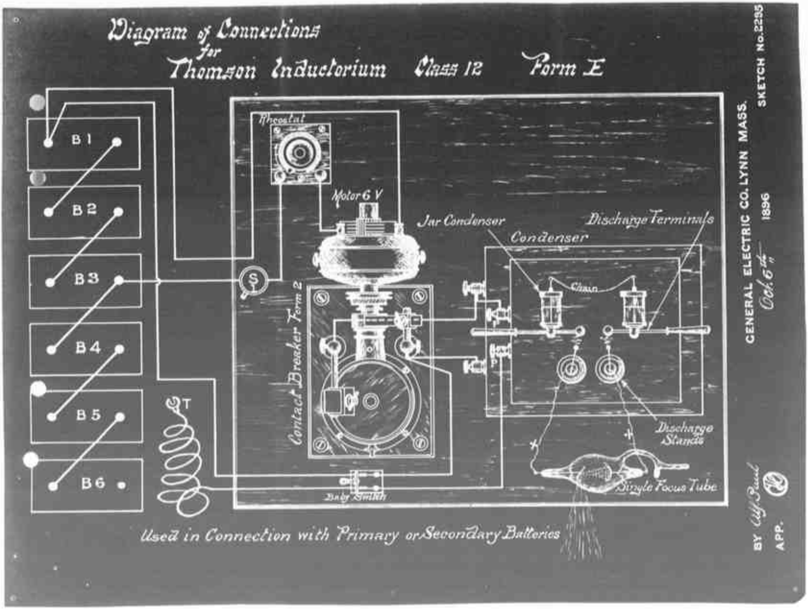
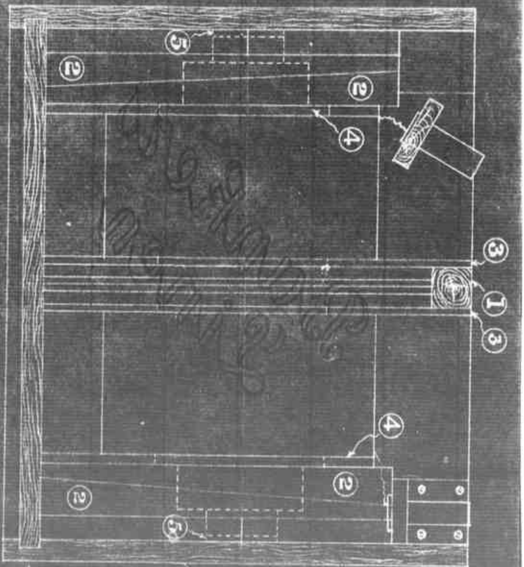


Diagram of Connections for Thomson Inductorium Class 12 Form E
B 1
B 2
B 3
B 4
B 5
B 6
T
S
Rheostat
Motor 6 V
Contact Breaker Form 2
Jar Condenser
Condenser
Chain
Discharge Terminals
Discharge Stands
+
+
Single Focus Tube
Baby Switch
Used in Connection with Primary or Secondary Batteries
SKETCH No. 2255
GENERAL ELECTRIC CO. LYNN MASS.
Oct. 6th
1896
BY Alf. Paul
APP.

[ENCLOSURE]



Method of Packing Thomson Inductorium
Class 12 Form E

BY Paul
APP. H. Lemp

GENERAL ELECTRIC CO.
Sept. 23d 1896

SKETCH No. X54

TAE-Friends
Nikolas Tesla

[INCORPORATED.]

A. D. SHAW, Business Manager

THE

Electrical Engineer.

A WEEKLY REVIEW OF THEORETICAL AND APPLIED ELECTRICITY.

EDITED BY T. COMMERFORD MARTIN AND JOSEPH WETZLER.

TELEPHONE: 1323 CORTLANDT
CABLE ADDRESS } LENGINEER.

New York, 120 Liberty St., Nov 25 98

Dear Mr Edison: "No ans"

In case you may not have seen it, I venture to call your attention to the enclosed.

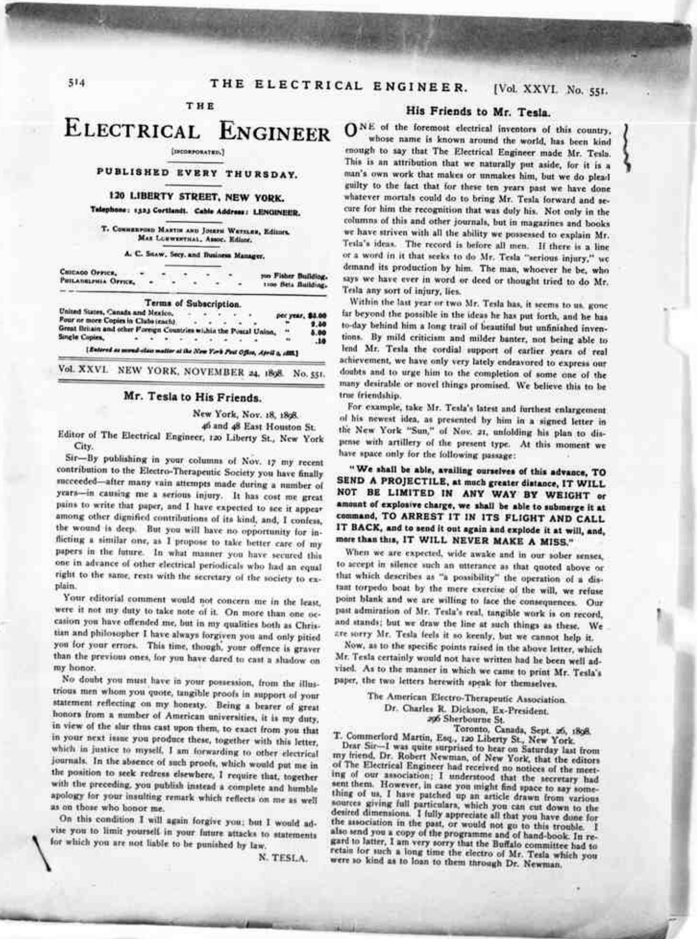
Let me ask you fairly and squarely whether you believe such things as these new ideas to be possible?

Very truly Yours

T. C. Martin

Did you see the Sci Am editorial this week?

[ENCLOSURE]



THE
ELECTRICAL ENGINEER
[INCORPORATED.]

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[*Entered as second-class matter at the New York Post Office, April 9, [illegible]*]

Vol. XXVI. NEW YORK, NOVEMBER 24, 1898. No. 551.

Mr. Tesla to His Friends.

New York, Nov. 18, 1898.
46 and 48 East Houston St.

Editor of The Electrical Engineer, 120 Liberty St., New York City.

Sir—By publishing in your columns of Nov. 17 my recent contribution to the Electro-Therapeutic Society you have finally succeeded—after many vain attempts made during a number of years—in causing me a serious injury. It has cost me great pains to write that paper, and I have expected to see it appear among other dignified contributions of its kind, and, I confess, the wound is deep. But you will have no opportunity for inflicting a similar one, as I propose to take better care of my papers in the future. In what manner you have secured this one in advance of other electrical periodicals who had an equal right to the same, rests with the secretary of the society to explain.

Your editorial comment would not concern me in the least, were it not my duty to take note of it. On more than one occasion you have offended me, but in my qualities both as Christian and philosopher I have always forgiven you and only pitied you for your errors. This time, though, your offence is graver than the previous ones, for you have dared to cast a shadow on my honor.

No doubt you must have in your possession, from the illustrious men whom you quote, tangible proofs in support of your statement reflecting on my honesty. Being a bearer of great honors from a number of American universities, it is my duty, in view of the slur thus cast upon them, to exact from you that in your next issue you produce these, together with this letter, which in justice to myself, I am forwarding to other electrical journals. In the absence of such proofs, which would put me in the position to seek redress elsewhere, I require that, together with the preceding, you publish instead a complete and humble apology for your insulting remark which reflects on me as well as on those who honor me.

On this condition I will again forgive you; but I would advise you to limit yourself in your future attacks to statements for which you are not liable to be punished by law.

N. TESLA.

His Friends to Mr. Tesla.

ONE of the foremost electrical inventors of this country, whose name is known around the world, has been kind enough to say that The Electrical Engineer made Mr. Tesla. This is an attribution that we naturally put aside, for it is a man's own work that makes or unmakes him, but we do plead guilty to the fact that for these ten years past we have done whatever mortals could do to bring Mr. Tesla forward and secure for him the recognition that was duly his. Not only in the columns of this and other journals, but in magazines and books we have striven with all the ability we possessed to explain Mr. Tesla's ideas. The record is before all men. If there is a line or a word in it that seeks to do Mr. Tesla "serious injury," we demand its production by him. The man, whoever he be, who says we have ever in word or deed or thought tried to do Mr. Tesla any sort of injury, lies.

Within the last year or two Mr. Tesla has, it seems to us, gone far beyond the possible in the ideas he has put forth, and he has to-day behind him a long trail of beautiful but unfinished inventions. By mild criticism and milder banter, not being able to lend Mr. Tesla the cordial support of earlier years of real achievement, we have only very lately endeavored to express our doubts and to urge him to the completion of some one of the many desirable or novel things promised. We believe this to be true friendship.

For example, take Mr. Tesla's latest and furthest enlargement of his newest idea, as presented by him in a signed letter in the New York "Sun," of Nov. 21, unfolding his plan to dispense with artillery of the present type. At this moment we have space only for the following passage:

"We shall be able, availing ourselves of this advance, TO SEND A PROJECTILE, at much greater distance, IT WILL NOT BE LIMITED IN ANY WAY BY WEIGHT or amount of explosive charge, we shall be able to submerge it at command, TO ARREST IT IN ITS FLIGHT AND CALL IT BACK, and to send it out again and explode it at will, and, more than this, IT WILL NEVER MAKE A MISS."

When we are expected, wide awake and in our sober senses, to accept in silence such an utterance as that quoted above or that which describes as "a possibility" the operation of a distant torpedo boat by the mere exercise of the will, we refuse point blank and we are willing to face the consequences. Our past admiration of Mr. Tesla's real, tangible work is on record, and stands; but we draw the line at such things as these. We are sorry Mr. Tesla feels it so keenly, but we cannot help it.

Now, as to the specific points raised in the above letter, which Mr. Tesla certainly would not have written had he been well advised. As to the manner in which we came to print Mr. Tesla's paper, the two letters herewith speak for themselves.

The American Electro-Therapeutic Association.
Dr. Charles R. Dickson, Ex-President.
296 Sherbourne St.
Toronto, Canada, Sept. 26, 1898.

T. Commerford Martin, Esq., 120 Liberty St., New York.

Dear Sir—I was quite surprised to hear on Saturday last from my friend, Dr. Robert Newman, of New York, that the editors of The Electrical Engineer had received no notices of the meeting of our association; I understood that the secretary had sent them. However, in case you might find space to say something of us, I have patched up an article drawn from various sources giving full particulars, which you can cut down to the desired dimensions. I fully appreciate all that you have done for the association in the past, or would not go to this trouble. I also send you a copy of the programme and of hand-book. In regard to latter, I am very sorry that the Buffalo committee had to retain for such a long time the electro of Mr. Tesla which you were so kind as to loan to them through Dr. Newman.

[ENCLOSURE]

I have to thank you very sincerely for the loan of the electro, and hope that it reached you in good condition.

Wishing your esteemed journal continued and increasing success, very truly yours. CHARLES R. DICKSON.

The American Electro-Therapeutic Association.
Dr. Robert Newman, Chairman.
64 West 36th St.
New York City, Oct. 20, 1898.

Messrs. T. C. Martin and J. Wetzler.

Messrs. Editors—We have now the necessary vote for you publishing Tesla's paper in The Electrical Engineer, you lending us the cuts in proper size for our transactions.

The pages of our book are 7½ by 5 inches—if our secretary is not dilatory, you will receive the mss. and illustrations at once. Will call soon. Yours most truly, ROBERT NEWMAN.

These show our relations with a deserving association and our efforts to assist its work. We may add as a matter of fact, for which, if necessary, the proofs will be presented, that before printing the paper, we sent Dr. Newman to technical publishers, who refused to print the matter in book form because there was not, in their estimation, sufficient demand for it among scientific men. Failing this, we were undoubtedly glad to give it a place in our pages, as it struck us as good "copy."

We venture also to direct attention to the dates of the Dickson and Newman letters, one Sept. 26 and the other Oct. 20. The Tesla paper was read on Sept. 15 and appeared in our columns Nov. 17. Does this gap of over two months between reading and publication justify Mr. Tesla's insinuation that we took swift and mean advantage of him and of our contemporaries? Will anyone produce a letter to show that anyone of our contemporaries ever took the slightest interest in the Tesla paper or even asked for it? If such letters exist, now is the time to produce them. The paper was given to The Electrical Engineer because this journal takes a deep interest in the advance of electro-therapists and has a wide circulation among them, and according to universal custom, the paper once read became the property of the association to deal with as it chose. That, without any particular effort, we should have secured a "scoop"—to use the slang of journalism—is nothing to be ashamed of; we rather glory in it, for whatever it is worth.

It will be noted that we placed freely at the disposal of the association a portrait block of Mr. Tesla which we value highly. We were anxious, however, to do him honor in this way, and loaned the original. Since that time, we have loaned it, without charge, to Mr. Belford, of "Success," in whose November issue it appears by our courtesy; and we have within the past week placed it at the disposal of another publishing house. Perhaps these are the attempts to do him an injury about which Mr. Tesla has so unfortunately allowed himself to be persuaded.

Now as to the very depreciatory quotations from the distinguished scientists, Profs. Brackett and Dolbear. The passage from Prof. Brackett appeared in the New York "Herald" of Nov. 9. That from Prof. Dolbear appeared in the New York "Herald" of Nov. 10. They had not been contradicted or withdrawn when we called attention to them and objected to them. One of our electrical contemporaries last week quoted them both like ourselves, but said it was inclined to agree with Prof. Dolbear. We now beg to call Mr. Tesla's attention to the subjoined dispatches from both scientists, and would say that having already expressed dissent from the views of both Profs. Brackett and Dolbear, we do not see how it concerns us any further.

(Press Telegram.)

Princeton, N. J., Nov. 20, 1898.

T. C. Martin, Editor of The Electrical Engineer, New York.

Some of the language on pages 490 and 491 of The Electrical Engineer of Nov. 17, purporting to be quoted from me, is a fairly correct reproduction of what I said to a "Herald" reporter in reply to his question as to the probable practicability of Mr. Tesla's device for the abolishing war already presented in the "Herald," a copy of which he showed me.

In the language which you quote, there is much confusion and inaccuracy, due to the fact that the reporter took no notes of what I said, but trusted his memory.

No subject other than that proposed, viz.: Is the proposed plan practicable, was discussed. C. F. BRACKETT.

North Cambridge, Mass., Nov. 21.

The Electrical Engineer, New York.

Letter received this morning. The "Herald" report was substantially accurate. I will write more to you presently.

A. E. DOLBEAR.

"Greatest Discovery of the Age."

Mr. H. W. Phillips, in the "Criterion" of Nov. 19, has an illustrated interview with Mr. Tesla, whom he quotes as follows in regard to his use of the coherer as a relay for steering dirigible torpedoes: "I think that it is the greatest discovery of the age. There is something artistic—an appeal to the imagination—in it that the telephone, phonograph and other fine inventions lack." In reply to an inquiry as to his ability to operate the coherer by an effort of the will merely, Mr. Tesla said to Mr. Phillips: "I have no evidence to support it, but I have a perfect right to state it—understand me—as a possibility—no more." Mr. Tesla also remarked: "Had I nothing else to show for a lifework, this would put the laurels of everlasting fame on my head."

The Evolution of the Surface Contact Railway.

THE sudden, swift and tremendous development of the open conduit railway system must have arrested the attention of every one who takes notice of electro-mechanical advance. Up to within the last year or two it seemed as though that method of traction would not operate successfully and economically in our American cities. Every trial resulted in utter failure in regard to convincing street railway managers that it was what they wanted. Now a change has come, and in New York nothing but the open conduit trolley has for the present the ghost of a chance; while many other cities bid fair soon to fall in line. Having fought hard for the overhead trolley, we can say that we welcome heartily this wonderful broadening out of the traction art, enabling electricity to capture the metropolis that was so long denied to it.

But is the end yet? Why need a conduit be open? Why must there be a couple of extra gutters in the street with bare exposed electrical conductors in them? We believe firmly that there is no final reason; but that the next step is some form of sealed conduit, or surface contact, system. Every indication points that way, and it is for this reason that we are glad to give space to the paper on this subject by Mr. E. H. Johnson, read last week before the New York Electrical Society. It must be remembered that he does not stand alone in his advocacy of the new departure. Both the Westinghouse and the General Electric companies have adopted sealed conduit systems, and reports of others come thickly from across the Atlantic. Such signs cannot well be mistaken.

As to the merits of the Johnson-Lundell system, it is hardly within our province to pronounce a judgment yet, but we wish it the fullest success. It has a great many good points, and it has behind it a man who despite the ardor of his enthusiasm has never yet backed a failure. Mr. Johnson ties to realities and builds up concrete successes, and it will be strange indeed if in the near future he does not see all his hopes as to surface contact railways realized to the fullest degree.

A New Electric Railway on Manhattan Island.

A certificate incorporating the Fort George Extension Railway Company, of New York City, with a capital of $10,000, was filed with the Secretary of State on Nov. 17. The company purposes to operate an electrical surface road from 172d to 185th street, on Eleventh avenue. Its directors are M. G. Starrett, W. P. Plummer, John Lambden, Andrew Loughlin, D. W. Patterson and Harry Hartwell, of New York City; John Kerr and Charles E. Corby, of Brooklyn, and H. A. Himely, of Far Rockaway.

Copy/+ Personal

May 29 - 1896

The Editor
Electrical Review
253 Broadway
New York

Dear Sir:-

In reply to your favor of the 28th inst, regarding letter from Mr C. J. Weeks, President of Moore Electrical Company, I beg to state that my impression is that this article is a foolish one on the part of Moore, as far as I am concerned I donot care what is said, but Tesla is of a nervous temperament and it will greatly grieve him and interfere with his work. While Tesla gives vent to his sanguine expectations when he should not do so, It must not be forgotten by Mr Moore that Tesla is an experimenter of the highest type and may produce in time all that he says he can.

Edison

June 16- 1896

D. Van Nostrand Coy.-
23 Murray Street
New York.

Dear Sirs:-

Please send me the following books mentioned in your April 1896 catalogue.

Tesla, Nikola Experiments with Alternate Currents of High Potentials &c.- Folio 4- your catalogue-

Allsop, F.C. Induction Coils and Coil-making &c Folio 22 your catalogue

Bonney, G.E. Induction Coils &c on Folio 22 your catalogue.

Induction Coils How Made and How used folio 22 your catalogue.

Trevert, Edward. How to make and use Induction Coils, your catalogue folio 22.

Yours truly
Thos. A. Edison

D
1896

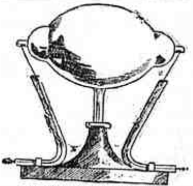
"X-Ray"

JUL 11 1896.

EDISON'S NEW WHITE LIGHT.

Said to Be Superior to Any Yet Produced by the Electricians.

At Edison's West Orange laboratory the other evening the inventor gave the first public exhibition of the new white light upon which he has been working for some time past. Thus far Mr. Edison has only made these lamps of three and one-half to four candle power, but he promises to produce a much better quality of light, with a great saving in its cost.


EDISON'S NEW WHITE LIGHT.

Many lamps were destroyed before one could be found to stand the stress of the high tension currents used. The only form that has been found feasible has been with sisiastic improvement. Mr. Edison had not until lately touched the subject at all, except that he made interesting tests fifteen years ago in perfecting his incandescent lamp with a filament in it. At that time he went further in the study of Geissler and Crooke's tukes, as they were then known, than anybody else. Experimenting recently with these tubes to get the best X ray effects, he found that certain crystals have the power to absorb the rays and give them out as a pure white light. With his wonted rapidity of intuition, he at once concluded that lamps coated with such crystals might be made which would be efficient, and, he says, their economy is far higher than he dared or ventured to hope.

N. Y. Journal.

APR 13 1896

FARO PLAYER AND X-RAYS.

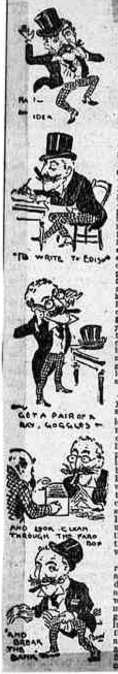
Mr. Edison Gets a Proposition from a Gambler for a Device to Read the Second Card.

The cartoonist, the comedian with pale green whiskers, the soubrette and the paragrapher have had their fling at the X ray. It remained for the gambler to advance seriously the idea of using the Roentgen discovery for the purpose of beating faro banks. When Thomas A. Edison opened his mail yesterday one of the first letters looked at was from a man in what is known as a "hat" town in the oil regions of Pennsylvania, as follows:

Mr. Thomas A. Edison, Menlo Park, N. J. —Dear Sir: I write you to know if you can make me an X ray apparatus for playing against faro bank. I would like to have it so I could wear it on my body, and have it attached to spectacles or goggles, so I can tell the second card on a deck of playing cards turned face up. If you will make it for me let me know what it will cost. If I make a success out of it I will pay you $5,000 extra in one year. Please keep this to yourself. If you can't make it will you be kind enough to give me Professor Roentgen's address. Please let me hear from you at once.

"That's the best yet," said Mr. Edison. "There's a fellow doesn't want much; just wants to carry an electric light plant in his hip pocket and an X ray lamp in each eye to beat a dealer of a Pennsylvania game, who is working overtime to satisfy my correspondent's desire to call the turn. He has probably figured out that about the only way to beat the game is to do so with a club."

The Edison works receive on an average five letters a day from "cranks" about the country wanting queer things made or offering suggestions in regard to improvements on articles manufactured at the works. They are all indexed and filed in the letter cabinet.


RAT-IDEA
"TO WRITE TO EDISON"
GOT A PAIR OF X RAY GOGGLES
AND LOOK CLEAN THROUGH THE FARO BOX
"AND BREAK THE BANK"

Philadelphia, Pa.-Ledger

MAY 29 1896

EDISON'S NEW LIGHT.

THE LAMP SHOWN IN THE "WIZARD'S" LABORATORY IN ORANGE.

HOW THE LAMPS ARE MADE

[SPECIAL TO THE PUBLIC LEDGER.]

NEW YORK, May 28.—Thom~~as A. Edison~~ to-day exhibited his new X-ray lamp in his laboratory at Orange, N. J.

The walls and the ceiling of the room where the experiment was made were covered with light-colored paper, in order to bring out the effect of the light. Mr. Edison closed the door and then called out "On." His assistant, in the next room, turned on the current, and the new lamp shone out, suspended in the centre of the room.

The light was a beautiful one, clear and white, and while Mr. Edison said it was only three and one-half or four candle power, yet, as the light was turned on and off and alternated with the sixteen-candle power incandescent lamp, one could not see much difference between them in illuminating power.

The new lamp is simply a Crookes tube of the usual shape, about five inches long and two inches in diameter. The peculiarity of the light is in the interior of the bulb. When it is being made about a thimbleful of crystals of a new substance is introduced into the bulb, and the latter is slowly rotated in an intense heat just short of the melting point of the glass. The result is that the crystals of this new substance are distributed evenly all over the interior of the bulb and are fused by the high heat till they form a coating all over the inside, firmly adherent.

All that Mr. Edison would say of this material was that it was a natural mineral, very abundant and very cheap, and that it possessed nearly three times the fluorescent properties of the tungstate of calcium, which was also the discovery of the "Wizard." He says the energy consumption is marvellously small.

Chicago, Ill. - Tribune

MAY 27 1896

NEW USE OF X RAYS.

Tesla and Edison Perfect a Revolutionizing Light.

BETTER THAN ARC LAMPS.

Illumination Is Pure White and Unusually Brilliant.

UTILIZED WITH THE CAMERA

Photograph Is Taken After Two Seconds' Exposure.

DISCOVERIES. ARE SIMULTANEOUS.

New York, May 26.—[Special.]—[illegible] and Tesla are making light of the X rays.

Tesla has perfected a vacuum tube system of electric lighting without wires. The rays of light are more brilliant, more intense, and whiter than those of the arc light. And they can be produced with less electrical energy. The power of it is ascertained by taking a laboratory photograph with it, an exposure of two seconds only being necessary and the production being wonderfully accurate in detail.

Tesla says he has simplified his apparatus and will have it ready for practical use soon.

It is a consummation of his ideas promulgated in a lecture delivered five years ago before the American Institute of Electrical Engineers. The Electrical Review, which issues tomorrow, will contain a scientific account of his discoveries.

And the same issue of the Review will give space to an account of Edison's utilization of the Crookes tube for the same purpose.

Edison has developed a lamp by means of which the Roentgen rays are turned into a pure white light. Edison's new lamp is an ordinary Crookes tube, coated on the interior surface with crystals of a new fluorescent substance which he has discovered, similar to tunsgate, or calcium. The rays in passing through this coating crystal are changed to light. Little heat is generated, and nearly the whole of the electrical energy expended is transformed into light. The new lamp is used in place of the Crookes tube, with the ordinary X ray apparatus. Edison believes there are great possibilities in his discovery and is enthusiastically at work perfecting his apparatus in commercial form.

For Practical Use.

He expects that before long he will so develop it that it may be used with high economy on an ordinary incandescent circuit.

Edison says of this new discovery:

"What I have succeeded in doing is this: Instead of generating X rays and throwing them off into space I have turned them into a pure white light of high refrangibility. It seems as if practically all the electrical energy is transformed into light. To the eye the light is pure white, resembling bright sunlight. It has none of the moonlight effect. The spectroscope shows, however, that there is plenty of red in it, and it is therefore a normal light.

"I can make these new lamps of any size, and the efficiency of the X ray apparatus used with them can be made high. I can run a number of these new lamps in multiple arc. I am now at work on endurance tests of the bulbs and am working to get the system into simple commercial form."

Praise for the Inventions.

Electrical and scientific people are watching eagerly the outcome of the work of these two great inventors on this important subject.

The Electrical Review will say editorially:

"We cannot hesitate to express our positive conviction that the introduction of a more perfect illuminant is near at hand."

It says: "Nikola Tesla has been suffering from a severe attack of the grip for two weeks past, during which time he was able to be at his laboratory a few hours only. He is now improving in health. He was seen at his hotel on Monday and asked, as the originator of vacuum-tube lighting, if he had anything to say about Mr. Edison's new vacuum-tube lighting, and replied characteristically that he had the utmost faith in the genius of Mr. Edison, and heartily congratulated him on his success as announced."

LLIGENC

Boston, Mass. Advertiser

Paper MAY 23 1896

NEW YORK GOSSIP.

Edison Challenges Tesla to Show His New Light.

New York, May 22.—Edison and Tesla are ck and neck in discoveries and Edison s tartly about it. Each has invented vacuum [illegible] light of [illegible] ness and illuminating power.

In a few days the experts attending the electrical show wil be given a view of Edison's new tube. Adjoining the black X ray booth is a smaller room for the use of the men who operate the apparatus producing the X ray.

The inventor has as yet made no announcement of his new light to the public, although a couple of months ago he stated that he had made a discovery in vacuum tube lighting in a paper written for an electrical journal.

When seen in regard to the great light claimed to have been made by Tesla, Mr. Edison said:—

"The claim that Tesla has invented a lamp that gives 10 per cent power may be correct. I have never seen it and consequently cannot say that he has or has not. For sometime I have been experimenting with vacuum tubes and have a lamp that gives from 12 to 15 per cent light. It is a white light and just what it is I will not state. I will, however, show it, and after it has been seen will tell what it is.

One lamp will light a room in every corner, and you can take a photograph by it. But that means nothing, as a two-candle incandescent lamp raised to about 5-candle power will take photographs. The vitascope pictures are printed by incandescent lamps.

"If Tesla has a light why does he not show it. Moore is showing his light and I wil show mine. Let Tesla come along an show. What counts in the world is t man who produces not the man who talk

Paper Boston, Mass.- Herald

[illegible] 1896

FRID

BEAUTIFUL, CLEAR, WHITE.

Thomas A. Edison Exhibits His New X-Ray Lamp.

Four-Candle-Power Produces Nearly as Much Light as a 16-Candle-Power Incandescent Lamp—An Enormous Economizer of Electrical Force—How the Light Is Produced.

[Special Dispatch to the Boston Herald.]

NEW YORK, May 28, 1896. Thomas A. Edison has consented to lift the veil of mystery that has surrounded his new lamp, and this afternoon he exhibited it. He has had the lamp in readiness quite a while, but was not ready to show it until he had completed the accessories.

He led the way today into the room where the X ray experiments have been conducted. Here was a transformation. The walls and the ceiling of the room were covered with light-colored paper, in order to bring out the effect of the light.

He closed the door, and there was Egyptian darkness till Edison shouted out, "On." His asistant in the next room turned on the current, and the new lamp shone out, suspended in the centre of the room. The light was a beautiful one, clear and white, and while Mr. Edison said that it was only 3½ to four-candle-power, yet as the light was turned on and off, and alternated, with the 10-candle-power incandescent lamp, very little difference could be seen between them in illuminating powers.

The new lam is simply a Crookes tube of the usual shape, about five inches long and two inches in diameter. The peculiarity of the light is in the interior of the bulb. When it is being made about a thimbleful of crystals of a new substance is introduced into the blub, and the latter is slowly rotated in an intense heat, just short of the melting point of the glass. The result is that the crystals of this new substance are distributed evenly all over the interior of the bulb and are fused by the heat until they form a coating all over the inside, firmly adhering.

Mr. Edison would not tell what this new substance was. All that hew ould say was that it was a natural mineral, very abundant and very cheap, nd that it possessed nearly three times the fluorescent properties of the tungstate of calcium.

"How do you expect to get greater light?" he was asked.

"That is very simple," he replied; "all that you have to do is to increase the size of the bulb and you get a larger amount of light. The fact is, that I have succeeded in imprisoning the X rays in the bulb, and there none can escape. I have tested very carefully for their presence outside of the bulbs, and there are none there."

Mr. Edison then said that the only thing further to do was to work out the problem of commercial values, and to overcome some of the difficulties in producing the light. He said: "This thing is a startling revelation in the wonderful economy of energy. When I first reached the result I brought out my ammeter and my voltmeter to test out the electrical energy required, and I was dumbfounded, when the calculation was finished, at the enormous saving. I was sure that there was some mistake about the matter, and that the meters were wrong. I got another set, and still another, yet the results agreed, and I realized what an enormous economizer of electricity this new lamp was.

"I found that the lamp of 3½ or 4-candle-power figured up an energy consumption of only 39 feet pounds per candle-power, while it is well known that the incandescent lamp as now used requires about 180-foot pounds energy per candle-power. Put it another way. Taking 33,000 foot pounds as the horse-power, and dividing by 39, we find one horse-power equal to 846 of these lamps."

"Have you tried them in multiple arc circuits?"

"Yes, and they work as well or better than singly, and so that part of the problem is solved."

"Have you succeeded in getting the X rays direct from the current and without the intervention of the Rhumkorff coil?"

"No, that has not been done. You see, the conditions are peculiar. Here I have in this induced current an intensity of 40,000 or 50,000 volts, with an amperage that is practically nominal. So far, no one has yet been able to do this without the Rhumkorff coil, or some other form of the induced current, but I am at work on a new transformer which I have great hopes of, and, if successful, we shall be able to get the X rays direct from the main current."

Paper Richmond, Va.- State

MAY 30 1896

Edison's Latest.

Mr. Edison's experiments with the X-ray have developed a new light that bids fair to be of great economy in the industrial world.

The new lamp is simply a Crooke's tube of the usual shape, about five inches long and two inches in diameter. The peculiarity of the light is in the interior of the bulb. When it is being made a thimbleful of crystals of a new substance is introduced into the bulb and the latter is slowly rotated in an intense heat just short of the melting point of the glass. The result is that the crystals of this new substance are distributed evenly all over the interior of the bulb and are fused by the high heat till they form a coating all over the inside, firmly adherent.

The light experimented with is about four candle power, but is equal in brilliancy to the ordinary 16-candle light. But more wonderful still, the new light shows an energy consumption of only 39 foot pounds per candle power, while the incandescent lamp now in use requires about 150-foot pounds energy per candle power. In plainer language Mr. Edison finds that one horse power is equal to 846 of these lamps.

This is an interesting statement truly and if the lamp is all that is claimed for it, it will be one of the most important discoveries of the great wizard. We have often wondered why, with the cheapness of electricity, the electric light should cost as much as gas, and we have continuously hoped and believed that a much cheaper light from electricity would be produced. It would appear that our hope has been realized.

occupation will be gone. Careful scientists, having the dearest interest of the race at heart, will produce men, and men only. The stoics of old were agreed not only that woman brought into the world all our woe, but that the actual presence of women in the human scheme is the prime difficulty in the way of leading the perfect life. Abolish woman, therefore, and the perfect life will be within the reach of all; the millennium will be attained. You remember the misogonist in Adam Bede, who held that the only thing women are good for is to bear children, "and even that they do in a miserable, makeshift sort. It ha' better been left to the men. It ha' better been left to the men."

Perhaps in the splendid future, whose dawn we now dimly discern, it will be left to the men.

N. Y. [illegible]

FINDING BULLETS WITH X RAYS

Experiments Upon Henry Suzenheim and Mr. Barnard.

Henry Sugenheim, the boy who is at Flower Hospital suffering from a bullet wound received accidentally at Rye Beach on Thanksgiving day, has proved a difficult subject for the surgeons in charge. The bullet was small, a short 22-calibre, and after entering the small of the back is supposed to have lodged near the spinal column and to have injured the sciatic nerve trunk. Great suffering was occasioned in the right foot and leg. When, after two days, the pain was undiminished, it was decided that the bullet must, if possible, be extracted.

Sugenheim was carried on Saturday last and again yesterday afternoon to the X-ray laboratory of O'Connor & Hanks, in West Fifty-third street.

The plates used were 17 by 22 inches and were placed under the boy's back as he lay on a couch. The Crookes tube was placed above and an exposure of twenty minutes was allowed. In the developed negative the lower ribs were well brought out and the spinal column appeared somewhat faint, but fairly clear in outline. No trace was found of the bullet, and it is supposed to have lodged close under one of the lumbar vertebrae. In that case another picture will probably be necessary before the operation can be performed.

The surgeon was able afterward to study the injured parts by means of the Edison fluoroscope, and could even faintly see the motion of the tissues of the abdomen in breathing. The absence of sharp contrasts in a radiograph of the abdominal cavity renders it particularly difficult to examine that region with the X ray. The operators said yesterday, however, that they had now limited the bullet to a small area and might soon locate it exactly.

Bullet wounds and bone fractures form the majority of X-ray cases at present. Two more successful examinations were made yesterday. The fractured elbow of a little child from the Post-Graduate Hospital was the subject of a fine negative. A bullet was also located in the neck of W. E. Barnard of Mount Kisco. The man was held up by a robber some time ago. Both fired, and Barnard received a wound just under the ear. The bullet, glancing down, lodged below the skull. In the radiographs a shadow appeared near a vertebra of the neck, and the surgeons will probe there for the bullet. Barnard is now at Bellevue Hospital.

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ager [illegible]

NOV 26 1896

SHE SAW LIGHT.

Edison's Successful Experiment on a Blind Girl.

X RAYS USED DIRECTLY ON THE EYES.

LIGHT WAS DISCERNIBLE

To the Subject for the First Time in Three Years.

Scripps-McRae Press Association.

NEW YORK, Nov. [illegible].—Another illustration of the marvelous power of X rays has just taken place in the Edison laboratory at Orange, N. J. A young girl of Newark received a severe blow on the head three years ago, which, acting on the optic nerves, caused total blindness. A friend took her to Edison's laboratory two days ago, not with the intention of testing the X rays, but to have the interior of her head examined to locate the pressure on her nerves.

The girl was placed under the rays, and although her head was completely permeated by the rays, no special lesion could be located. The head was so transparent while the X rays were playing on it that Mr. Edison placed his own hand on the opposite side of it and distinctly saw the bones.

He thought he would try the effect of the X rays directly on her eyes, and the girl instantly saw light for the first time in three years. She was also able to tell the shapes of different objects placed before her.

N. Y. Herald.

NOV 30 1896

PICTURES BY WIRE THROUGH X RAYS.

Dr. Robert D'Unger Uses Roentgen's Discovery to Transmit Drawings Over Long Distances.

DEPENDS ON VIBRATIONS.

Tests of the Machine Have Been Remarkably Successful, Though It Is Unfinished.

LIKE TELEPHONE IN THEORY.

[BY TELEGRAPH TO THE HERALD.]

CHICAGO, Ill., Nov. 29, 1896.—Latest of all the developments of the Roentgen ray is the telephot, a device by which it is promised any form of printed matter, writing or pictures can be sent over a wire and reproduced faithfully at the other end.

The possibilities of the new device are far-reaching. Not only will despatches be transmitted in the senders' own handwriting, according to the inventor, but printed matter, although the experiments are not conclusive as yet. Photographs, lithographs, etchings and oil paintings may appear as photographs at the other end of the line over which they are sent.

The inventor of this device is Dr. Robert D'Unger, who lives at No. 2,019 Prairie avenue and has an office in the Palmer House.

With the first agitation regarding the Roentgen rays Dr. D'Unger became interested in the subject on account of the medical possibilities involved. Reflecting one day on the nature of the mysterious vibrations—which, he holds, are merely etheric disturbances—he decided they ought to be put to some commercial use. A little study put him on the track of a picture telegraph, and the telephot was born. Almost his first trial was successful.

The apparatus by which these astonishing results are expected to be obtained consists of an extremely simple arrangement. The first essential is two Crookes tubes of equal intensity and resistance. One of them is destined for the sending end of the telephot and one for the receiving.

The one at the sending station is mounted in the usual manner, with an induction coil battery and is made to give off the Roentgen rays. Below it is placed the picture to be transmitted, laid out flat on a thin slab of vulcanite or other suitable material. Still further below that is the variator.

The variator is the most important part of the invention. It consists of two parallel rods, across and at right angles to which are several metal strips. The rays going through the picture strike on the first of these two pencils and produce a mechanical impact. This vibration is transmitted to the second rod by means of the metal cross pieces. The shocks to this second rod, which is made of carbon, in turn vary its electrical resistance so as to produce a change in the current flowing through it to the other end of the wire.

At the receiving end this fluctuating current is passed through the primary of an induction coil, while the other Crookes tube is attached to the secondary, giving the vibrations of current in the main circle from the sending end. The second induction coil transforms them into an alternating current, which will produce the usual action in the receiving Crookes tube.

Under the receiving tube is placed a piece of sensitized paper or a dry plate such as photographers use. This is subjected to the direct action of the tube, and a short exposure will reproduce a shadow negative of the print or picture at the transmitting end.

The theory on which the telephot works is like that of the telephone. The inventor figures that the Roentgen rays, in going through the picture at the sending station, are partly cut off by the material through which they pass, and hence produce a modified action upon the variator. These modifications are in turn sent over the line in the electric current just as the voice vibrations are transmitted in talking through a telephone.

Then at the farther end these vibrations are changed back to the Roentgen rays, which act in an unequal manner on the sensitized plate, reproducing the original properties of the picture sent, or rather a shadow negative of them.

D
1896 "X-Ray"

Allentown, Penn. - Item

NOV 28 1896

MR. EDISON, the wizard of electricity, rejects the rash promise attributed to him that within three years he will be enabled to make the blind see, provided the optic nerve is intact. He is more cautious. A few days after a siege of hard work in his laboratory his eyes began to smart and pressing his hands to them he was astonished to find that although his eyelids were closed, the bones in his hands were distinctly visible. This fact led to the startling theory that among the great possibilities of the Roentgen ray was that of enabling the blind to see. Some further experiments were made, by which the blind could see rays of light, but not distinguish things. The experiments have not been advanced so as to obtain definite results, and will not be for some time, but the leading physicians, who have been interviewed by the New York papers, are inclined to be decidedly incredulous. They declare that while it is possible that impressions of light may be obtained, provided the optic nerve is all right, the destruction of the retina of the eye removes the mirror in which the forms of surrounding objects are taken cognizance of, and this fact precludes, except in perhaps exceptional cases, any relief to the blind. For the present, of course, the better of the argument. It rests with Edison to prove that they are mistaken, and that electricity has once more achieved what was apparently impossible; but he is not at all confident that what is claimed for his accidental discovery can be accomplished.

Cincinnati, O. - Enquirer

NOV 29

EIGHT BLIND PUPILS

Tested With the X Rays in Columbus—Given No Sight.

SPECIAL DISPATCH TO THE ENQUIRER.

COLUMBUS, OHIO, November 28.—A test of the X rays was made this afternoon on a number of pupils from the Blind Asylum by Drs. Lewis Early and C. F. Clarke that will be of great interest to the scientific world. It was a test of the power of the rays to assist the blind in seeing and was made at the request of a number of the physicians of Columbus. The doctors took eight of the pupils whose blindness was attributable to eight different causes, and made a thorough test in all cases.

Dr. Early was seen to-night by an ENQUIRER representative and asked to give the result of the tests. He said he and Dr. Clarke made the test under the most favorable conditions, and he was now prepared to pronounce the assertion that the blind could be benefited by the rays as a fraud of the first water and a hoax pure and simple. The children, he said, could no more be benefited by the rays than they could by any other means.

He is glad, however, that he made the test and is satisfied himself that the claim is false.

D
1896 "X-Rays"

N. Y. Press.

NOV 30 1896

DANGER LIES IN THE X RAYS

Exposure of the Body to Them Causes Bad Burns.

MANY SUCH CASES KNOWN

Elihu Thomson Proves the Fact by Experiment, and an Army Captain Is a Sad Example.

If X rays are not extremely dangerous they at least are not to be trifled with. This conclusion has been forced upon scientific men by recent distressing results of the use of the rays in experimental as well as in practical work.

The warning is issued that danger may follow the handling of the rays by untrained experimenters and that too much care cannot be exercised in popular exhibitions.

Rumors of unpleasant experiences have been circulating among the laboratories where the X rays are being studied and used, but little definite information was given the public until Elihu Thomson told of a particularly painful experience in the Electrical Review on November 25.

EXPOSED FOR A HALF HOUR.

Mr. Thomson had heard about the powerful action of the rays on the tissues of the human body and tried the effect of exposing one of his little fingers for half an hour to the radiation from a Crookes tube. He is thanking his stars that in his scientific zeal he did not expose his whole hand.

This is his experience: About a week after he exposed his finger to the rays it became swollen, reddened, stiff, sensitive and painful. The least pressure on the finger caused suffering.

Two-thirds of the finger became covered with a large blister, and it was not until after seventeen days of this unpleasant condition that the finger showed signs of growing better.

TROUBLE BEYOND A CERTAIN POINT.

Mr. Thomson says: "There evidently is a point beyond which exposure to X rays cannot go without causing serious trouble." He says that the fingers not directly exposed to the rays were made sore, but not so badly as the one directly submitted to the experiment.

He is satisfied that similar unpleasant results might be the outcome of shorter but repeated exposures at a greater distance from the source of the rays. It is his opinion that the effect produced is an "evidence of the chemical activity of the rays of like character to the effect of high pitched waves of light in producing sunburn, but penetrating more deeply."

Mr. Thomson issues a warning to experimenters and closes it with the pertinent remark: "Personally I have been more than satisfied with the result of my own inquiry into the action of the rays on my own tissues."

EXAGGERATED SUNBURN.

Electrical workers back up Mr. Thomson's remarks as the result of personal experiences. They agree that the effect of exposing the hands and arms to the action of the X rays in experimental work invariably is to make the parts swollen and sore.

"It looks like an exaggerated case of sunburn," said a worker in one of the big laboratories. "The funny thing about it is that any one who has not been exposed previously to the influence of the rays does not experience any pain when brought within their influence. It is only after being burned that one becomes sensitive."

CASE IN THE ARMY.

A direct warning against the unrestricted use of the X rays in surgery comes from Washington, where the army surgeons are studying the painful experience of Captain J. McA. Webster of the Twenty-second Infantry. This officer was submitted to the X rays for the purpose of finding a bullet in his back.

As a result he has been confined to his bed for more than a month. His abdomen has all the appearance of having been burned frightfully.

Captain Webster's wound was near the lower part of the spine, and paralysis was feared. He was submitted to numerous applications of the rays on several occasions, the trial sometimes lasting for hours.

SUFFERED TERRIBLY.

After several days he practically had the experience recorded by Mr. Thomson, but on a larger and more dangerous scale. He appeared to be suffering from severe burns, and required constant attendance to prevent dangerous results.

The nail came off the thumb of the hand which had been nearest the apparatus for producing the rays as he sat in the operating chair, and his beard came out.

Surgeon General Sternberg admits that similar cases, although not nearly so severe, have resulted from the use of X rays in surgery.

OTHER PHYSICIANS' VIEWS.

Dr. J. M. Morton, who has written a book on the use of the rays, remembers a fellow experimenter who had the skin peeled off both hands as a result of exposure. Dr. Herbert L. Constable says that in some cases the hair has fallen out after exposure to the rays.

Several physicians in this city are inclined to believe that the severe experience of Captain Webster was due to his having been treated by inexperienced persons. But the consensus of opinion is that such results show an absolute necessity for careful handling of the rays, and indicate an unexpected element of danger in their continuous use.

ONE STORY NOT BELIEVED.

A story from Kansas to the effect that a young woman had to have her foot amputated because abscesses formed after the use of the rays to discover a disease of the ankle joint, finds no believers among physicians here.

Any one can satisfy his mind as to the power of even the common incandescent light by holding his hand close to the bulb. The effect will be to redden the skin, and from this simple experiment the danger of trifling with the far more powerful rays of the Crookes tube readily may be estimated.

Glen Cove N.Y.-Gazette

NOV 28 1896

Chicago.

Will the Blind See by the X Ray?

Individuals who are unable to perceive any difference between night and day ordinarily have, when the X ray is thrown strongly upon their eyes, seen points of light. Both the blind men with whom Edison has been experimenting were able to see such light.

The strangest experiment, however, was that made in San Francisco. Here a young man totally blind could, by means of the X ray, perceive objects through a 2 inch pine board. In fact, he seemed to see better through the board than he could when it did not intervene. The vision was not very perfect. He was only able to discern the size and shape of various objects. The fact that he could see at all where before he had been totally blind, however, was sufficiently well authenticated.

These experiments may be the beginning of a new life for the blind. Some kind of spectacles or apparatus may be invented that will enable them to utilise the X ray. If they can be made to see objects distinctly enough to make their way about alone, that will be an infinite gain for them. The experiments give a hope to the blind whose optic nerves have not been actually destroyed.

Chicago, Ill. - Chronicle

NOV 30 1896

The X ray has taken a new hold upon public interest, and last Saturday it appeared in various forms of news items. From New York comes the information that Edison has demonstrated beyond a doubt that the blind can be made to see by means of the fluoroscope. At Salem, Mass., the Roentgen discovery is asserted to have caused hair to grow on a bald head. In Washington there is a man who claims to have been terribly injured by the ray while subjected to its influence during a search for a bullet in some part of his anatomy, and from far-off Butte, Mont., we learn that the district court has rejected the X ray as evidence in a suit for damages. Altogether it was a great day for the ray.

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JUST HOW IT IS THAT THE X RAY CAN MAKE THE BLIND TO SEE.

EDISON'S MARVELLOUS NEW EXPERIMENT.

Thomas A. Edison:

"[redacted]-year-old girl, who had been totally blind for two years, came out here from Newark yesterday, and I tried her sight with the cathode ray. She was the third blind subject upon whom I had tried the experiment, and was more intelligent than the other two. She had not seen anything for two years.

"As soon as the light was turned on in the tube she knew it. She told me she saw the light. I turned it on and off in order to test her power of discernment and her truthfulness. She knew it every time the light was turned off. The tube was moved about her head and she followed it with her eyes. She could not only see it, but she knew in which direction it was moved. She also detected the shadow of an object placed between herself and the tube.

"The little girl seemed to be truthful and honest, and the experiment was performed in the presence of a number of people. I do not understand the operation of the eye, but I do know something about light. I believe the eye may not see by one light, but may see by another. It is useless for blind people to try to see with the cathode rays, using a fluoroscope, for the fluoroscope changes the rays to ordinary light. The experiment should be tried without the fluoroscope, as I tried it on the little Newark girl. Her eyes may be sensitive to one light and not to another.

"The Roentgen ray may give just the vibration which will affect her eyes, while that of ordinary light may not influence them. A lot of work must be done before the full possibilities of the Roentgen ray in affecting the eyes of those who have been blind will be known. The thing is yet in its crudest stage, but there is no doubt that the Roentgen ray makes an impression on people who have been blind, and that under certain circumstances it enables them to see."

PROFESSOR WRIGHT, OF YALE, IS HOPEFUL:

Professor A. W. Wright, of Yale University:

"I see no reason why the X ray should not be advantageously employed in aiding the blind. The rays are known to have a peculiarly sensitive effect upon the skin, and I see no reason why they might not so stimulate the retina of the eyes of the blind that, at least, temporary sight might be restored. Whether this sight could be made permanent is a matter of conjecture. Personally, I have not experimented in that direction, and can only give my impressions, derived from what I have read and learned of the experiments of others. There are great possibilities yet unknown in this mysterious light, and the restoration of sight to the blind is not among the least improbable of its results."

DR. JEFFREYS'S EXPLANATION.

Dr. B. Joy Jeffreys, the eminent ophthalmic surgeon, of Boston:

"If the blind men experimented on thought they saw, it must have been in their imagination. If they were totally blind from the retina being destroyed, there was nothing to receive the impression of light or any other sensation of sight. In cases of total cataract the application of the powerful Roentgen ray would give a momentary sensation of light, but that is all, and the patient would return to darkness the moment the light was reduced without having been able to discern form in any way. The optic nerve is not an organ of sight or a medium of sight, but simply transfers to the brain the results of sight, and if it were possible to 'excite it' it could not convey a sensation of light. In plain language, if the sight is absolutely gone, there is no hope of restoring it. If it is simply obstructed by a cataract, and if another body gets between the eye and the light, the darkness returns, but in neither case can forms be discerned, and consequently sight is not restored."

WHAT DR. REULING, OF BALTIMORE, SAYS.

Dr. George Reuling, of the staff of professors of the Baltimore Medical College, Baltimore, Md.:

"In my opinion, this wonderful light will only serve to stimulate the optic nerve, and probably cause an absorption of exudations within the interior membranes. The eye being a transparent organ, the rays will penetrate to such a degree as to reveal the skull bones without giving an insight to the eye proper. It is almost beyond conjecturing powers to imagine the construction of an instrument that will do the work of the ophthalmoscope. With this instrument every known disease or affection of the eye [redacted] be diagnosed."

The Way the X Ray Assists the Oculist.

It has been shown that many people who are blind cannot see by the aid of the cathode ray. But the importance of the discovery that it offers a new hope to the blind lies in this fact—that the majority of the people who are blind are deprived of sight because the diseased parts of the eye lie in the front of the retina, which is the deli-[illegible] membrane that receives the image like a photographic plate and transmits it to the brain through the optic nerve.

When the retina and the optic nerve, which form the back of the eye, remain in a healthy condition the seeing apparatus is still perfect, although the organs intervening between them and the front of the eye may be diseased. The bulk of the work done by oculists concerns those organs that lie in front of the retina and the optic nerve. These organs include the sclerotic, the choroid, the ciliary muscle, the cornea, the iris, the aqueous humor, the lens and the vitreous humor. It has been found that the cathode rays may penetrate any or all of these organs and reach the retina.

There is hardly any condition of disease which may affect these organs lying in front of the retina which would make them impenetrable to the cathode rays. Of course it is obvious that if the retina and the optic nerve have been destroyed by disease the prospect of recovering the sight is hopeless. But right here comes in one of the greatest forms of usefulness of the cathode rays in assisting the oculist.

The physician can now learn at once whether or not the retina and the optic nerve remain intact. The cathode rays will show instantly if these organs are in a healthy condition, as they have the power to penetrate through the outer organs. If the patient can see the light and can discern large dark shadows, as has been done by many blind people who have been experimented on, then the oculist may know at once that the retina and optic nerve are still healthy. A grave doubt which has caused endless suffering and expense to patients in the past can thus be at once removed by this simple process, within the reach of every oculist. If the retina and the optic nerve are destroyed, the oculist and his patient may thus know it at once, and be saved from entertaining false hopes that can never be fulfilled.

Blind people who for years had not seen the light have been enabled by the cathode rays to see the shadow of their hand, passed between their face and a Crookes tube. The fact that their eyes were closed made no obstacle to the path of the rays, which penetrate through the eyelid as easily as through a piece of wood. Others whose eyes were wide open were not affected by ordinary sunlight, but clearly perceived the shadows cast from cathode rays. Many experimenters are working silently along the lines opened up by these marvellous demonstrations of the new usefulness of the Roentgen ray, and further discoveries are expected in the near future.

AMONG THE POSSIBILITIES, SAYS A. GRAHAM BELL.

Prof. Alexander Graham Bell, Washington, D. C.:

"The reported discovery of the [illegible]itiveness of the closed eye to Roentgen rays is important if true. With our [illegible]wledge it is impracticable to focus the rays by refraction or reflection, to p[illegible] an image in the eye. The rays transmitted through a fine hole in a screen should form an image analogous to a pin-hole photograph, but this would be an image of the excited tube, and no power of seeing other things need be expected until rays can be produced capable of reflection from an ordinary object. An X-ray lantern may be among the possibilities, but we have not got it yet. Experiments had best be left to physicians and oculists."

WHAT ONE BLIND MAN SAW.

Dr. Charles P. Elwart, No. 47 West Sixteenth street:

"I witnessed a remarkable demonstration of the power of the Roentgen rays in enabling the blind to see. A young man, twenty years of age, who had been blind for seven years, was the subject. There was no doubt of the fact that his sight was gone, at least so far as seeing things unaided was concerned. When the X rays were first tried he could not see them. Then a pine board, two inches thick, was put in front of his face and between his eyes and a cubical object.

"He actually saw this cube through the two-inch board, and accurately described it. Next he saw an iron comb behind a fluoroscope. He described it as a musical instrument of some kind with teeth. There was no doubt at all that he saw these objects, for he described them without knowing beforehand what they were like. It was likewise certain that he had not previously seen anything for some years. I did not believe the Roentgen rays could enable a blind man to see until I witnessed this experiment, but now there appears to be no doubt of it."

A NEW YORK OCULIST'S OPINION.

Dr. Frank D. Skeel, 41 West Twenty-third street:

"I have made a few experiments, but have not had much success thus far. Whether or not a blind man can be enabled to see by the aid of the Roentgen rays seems to me to depend upon the condition of the retina and the optic nerve. If they are all right, it seems probable that these powerful rays will penetrate through the cornea and the lens of the eye, even if they are diseased. Lights and shadows can thus be conveyed to the retina through opaque substances, and the image, dim though it may be, can thus be transmitted to the brain. It remains to be seen, however, if these impressions can be conveyed with any considerable detail and distinctness."

AN OPTICIAN'S EXPLANATION.

E. B. Meyrowitz, of No. 104 East Twenty-third street:

"After the experiments which I have witnessed I do not hesitate to say that in many cases of blindness, where the optic nerve and the retina are in good condition, effects of partial vision, resembling shadowgraphs, may certainly be obtained. The visual part of the eye consists essentially of two parts—the front of the eye, the lens, and the back of the eye, the retina or sensitive plate upon which images caught by the lens are recorded. If the retina is destroyed, it is hopeless to attempt to restore sight. But if the sight has been destroyed by disease, affecting the parts of the eye which lie in front of the retina, then the Roentgen rays are so powerful that they seem to penetrate to the retina and convey clearly marked shadows."

DR. MORTON'S EXPERIMENTS.

Dr. S. Millington Miller, New York:

"I was present when Dr. William J. Morton, of No. 19 East Twenty-eighth street, performed an experiment upon Miss Rodney, an elderly lady, who was entirely blind and was sent from the New York Institute for the Blind, as well as upon Armin Schotte and Gustav Kaufman. We got fairly good results in the case of Schotte after his eyes had been subjected to a prolonged bath of Roentgen rays. He saw the light distinctly and could distinguish coins nailed to a piece of board. The retina of his left eye was evidently untouched by disease, whereas the retinas of the other subjects were evidently atrophied and inoperative. Dr. Morton and I tried experiments upon ourselves. Closing our eyelids tight and shutting off the tube by the intervention of a piece of cardboard, we were able to tell when a square piece of iron was interposed between the cardboard and the Crookes tube. This showed that the X rays stimulate the retina."

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BLIN CHILD SEES.

A Little Newark Girl Experimented Upon by Edison.

Has Been Sightless More Than Two Years as the Result of a Fall.

Brass Disk Held Before Her Eyes and She Said, "I See a Plate."

She Also Told, to the Wizard's Great Joy, That It Was of Yellow Color.

HER EYES FOLLOWED A LIGHT.

The Inventor Believes It Will Be Possible for a Blind Man to Identify a Signature with Which He Is Familar.

With the aid of the X rays nine-year-old Katie Schoellner, of Newark, N. J., has been able to see again after having been totally blind for two and one-half years.

The experiment with the rays on the sightless eyes of the little Schoellner girl was made in the laboratory of Mr. Edison, at Orange, N. J., one day last week.

Two and one-half years ago, Katie, who is the daughter of F. O. Schoellner, a tanner, of No. [illegible] and 99 Bergen street, Newark, fell from the piazza of her father's house. The fall crushed one of the bones of the skull and, it is thought, caused a pressure on the optic nerve, paralyzing it so that the sight was destroyed.

Last week, after reading of previous experiments, the child's father thought perhaps the X ray lamp might be able to locate the difficulty with the eyes, and was given a letter of introduction to Mr. Edison. The intention at that time was to discover if possible what affected the child's eyes and caused the blindness. It was expected that something of value to the [illegible] exposing her head to the rays and locating the trouble. The child, accompanied by her father, was taken to the laboratory last Tuesday. Mr. Edison said he would do nothing to try to discover what ailed her eyes unless the physician who had treated her was present, but he consented to see if the X rays would enable her to see.

Actually Saw the Objects.

The little girl was placed in a chair and asked by Mr. Edison if she could see anything. She said "No." The X ray lamp was then turned on. It was moved near her face and she said she saw a light. Her eyes followed it about as it was moved from side to side, and she told of its movements. Mr. Edison put his hand before the lamp, shutting out its light, and she noticed it. She also saw that a hand was between the lamp and her face and told those about her what it was. A brass disc about the size of a plate was then held between her and the light and she said:

"I see a plate. It is a yellow plate."

The next evening an attempt was made to discover by means of the fluoroscope what caused the child's blindness. This was unsuccessful. A photograph, however, is expected to show it.

Mr. Edison, speaking of the experiment last night, said: "I was telephoned from Newark by Mr. Salomon, the tanner, who asked me if I would lend my laboratory to experiment on a child to locate a bone. I understood that the girl had fallen or met with some accident and a bone pressing down had caused a pressure on the optic nerve and that she had been sightless for two years and a half. When the child arriving with her father I refused to do anything without the physician being present, but while there thought to see what effect the rays would have upon her eyes.

"My experiments with the rays' effect upon blind people had been chiefly upon myself. I had blindfolded myself until I was in a condition of a man with cataracts on his eyes, and had turned on the lamp. And while sitting thus I had seen the X ray lamp which was on a table in front

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A BLIND GIRL MADE TO SEE.

Wizard Edison Describes for the Sunday World a Remarkably Successful Experiment with X Rays.

IN the week just closed Thomas A. Edison witnessed, in his laboratory at West Orange, one of the most remarkable demonstrations of the power of the X rays that it has been the good fortune of any of the scientific men experimenting in that direction to observe. The demonstration was occasioned by the visit of a blind girl, and differed so greatly from the results of all other experiments with blind subjects that Mr. Edison stopped short and refused to go further without having a physician in attendance. Not only did the blind girl see with the aid of an X ray, but she was able to distinguish color, which is still more remarkable. Incidentally, the experiment shows beyond all doubt that with the aid of X rays persons afflicted with certain forms of blindness can be made to see.

RELIEVES CERTAIN FORMS OF BLINDNESS.

That point, since the original discovery by Mr. Edison, has been disputed. He has been confident that the rays would relieve certain forms of blindness, but never had an opportunity to put that belief to a proper test until last Wednesday.

Two blind men visited the laboratory in the early part of the present month, and the X rays were tried on them, but the result was far from satisfactory to Mr. Edison. The men were unable to speak English, and before they reached the laboratory some one told them their sight was to be restored. Both were of a highly nervous temperament, and were so agitated over the prospect of being able to see that when they reached the laboratory they were in a state bordering on hysteria. They answered "Yes" to every question put to them, but could explain none of their sensations.

Since that time Mr. Edison has been anxious to get an intelligent subject who could describe what he saw and felt. [illegible] years old. [illegible] in Newark, N. J., and is the sister of a well-known business man there.

A little over two years ago, while playing with other children, she fell upon her [illegible] a fracture of the top of the skull on the right side, just forward the ear. Up to the time of the accident her sight had been normal, but after that she became totally blind. Since that time the parents of the child have made every effort to have her sight restored.

EXPERIMENTED WITH A BLIND CHILD.

It was in that connection that she visited the laboratory of Mr. Edison. A physician in Newark who had examined the child's head believed that the blindness was caused by pressure on the optic nerve, due to the fracture of the skull. He suggested to the parents that the child be taken to Edison's laboratory that the fracture might be examined with the X rays. The physician was called away suddenly and did not accompany the child to the laboratory.

She appeared there with her father. The rest of it is best told in Mr. Edison's own words, as he explained it to a Sunday World reporter:

"It was just by accident," he said, "that I discovered the power of the X ray in this case. Incidentally, I took the child into the dark room and turned on the current into a short-ray tube. I passed my hand before her face and she said she could see it. Then a brass dish was held up. 'Why, that's a plate,' she said. After looking at it a minute she said: 'It's a yellow plate.' As she is an intelligent child, I was interested, of course, but didn't care to go any further with the experiment just then. I want her to come here again and have the doctor with her, so that he can tell just what is going on. I am not a physician, and don't pretend to know anything about that end of it."

"How do you account for her seeing your hand and detecting the color of the dish?" Mr. Edison was asked.

EDISON EXPLAINS HIS TESTS.

"I don't know," he answered. "I suppose there is a piece of bone pressing down on the optic nerve, which interferes with it. The child's eyes were entirely normal except for the lack of expression you observe in blind people. There was no film or cataract or anything of that kind over the eyes. I suppose it is just the same as if you took hold of the optic nerve and pinched it in the centre. The light of the rays must have penetrated back [illegible] How she was able to see I don't know, and don't pretend to be able to explain. All I know is, we got the result. She is coming out here again soon, and if the doctor is with her we will know more about it."

"You see," Mr. Edison continued, "I have been experimenting on myself. Y-es, I'm a pretty good subject. I've had myself blindfolded in all sorts of ways, and have been able to see lots of things."

"Doesn't the bombardment by the rays tend to destroy the flesh about the eye and the eye itself?"

"Yes, if you use it frequently. Some of my men have had their hands swollen to a terrible size. I avoid that by not subjecting my eyes to rays—that is, the short, sharp rays—for more than ten seconds at a time. You know there is a difference between the effect produced by the short-wave tube and the long-wave tube. There is as much difference between the rays as there is between a bass violin and a piccolo. The rays that make the short wave and the sharp shadows don't pass through the flesh. The rays from a long-wave tube don't throw a shadow, but pass through bones, flesh and all. Half an inch of glass will stop the rays from the short-ray tube, while the rays from the long-wave tube will pass through several inches of glass.

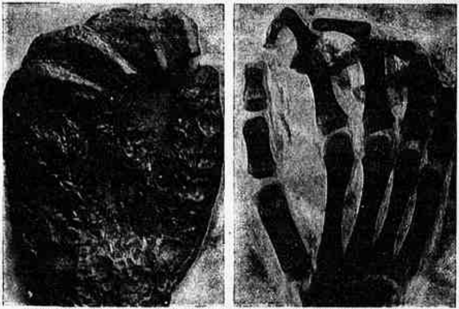
"Now, when I use the short-ray tube more than a certain number of times my eyes feel as if they were full of sand. That feeling passes away on the following day. But there is no such sensation with the long-wave tube. The long wave doesn't destroy tissue, and that is what makes it of value to blind people. The short wave would destroy the eyes if used constantly, while the long wave would have no effect whatever in that way.

"In all these experiments you must take into account the sensitiveness of eyes covered by a cataract or something of the kind. I find that by staying in a dark room for thirty minutes my eyes are twenty-five times more sensitive than in ordinary light. I suppose that a blind man's eyes are two hundred times as sensitive as ours—maybe more. That is going to help us in determining the value of the X rays in this connection."

THE PROGRESS OF SCIENCE.

Edison

Advance in Photography During 1896.—Few years have provided more food for thought in photographic circles than the one which has just passed. The province of photography has been distinctly enlarged and the art-science has triumphantly demonstrated its claim to preëminence as a recorder of facts. The scientist and artist, the amateur hand-camerist, the professional, all use photography as a means of producing a permanent record of that which is presented to the camera. It is true that photography is not yet an infallible recorder. Errors are apparent in practically every photograph made—errors in color values to which we have become accustomed. Again, the camera fails to depict colors; but such rapid strides are being made that it seems highly probable that a satisfactory method of reproducing objects in colors closely approximating those of the originals will soon be forthcoming. To this end many efforts are being made, and it is rumored that an indirect method of great promise has already been discovered. Yet, in spite of these limitations, photography has



PHOTOGRAPH AND RADIOGRAPH, MADE BY JOHN CARBUTT, OF THE MUMMIFIED HAND OF AN EGYPTIAN PRINCESS.

made for itself a place in practically every industry and has a strong claim on the attention and consideration of the artist, and all of this by virtue of its value as a means of record.

* * * *

In the line of materials for the use of photographers, the trend during the past year has been toward reducing the bulk of material carried and increasing the portability of the outfit. The bicycle has been largely responsible for the perfection of the folding cameras, and complete outfits are now supplied that can be easily carried on the wheel and used either in the hand or attached to the handle-bar by a clip. Smaller cameras for the pocket have met with much favor and the popularizing of photography has gone on merrily.

RADIOGRAPH OF AN INFANT, TAKEN BY JOHN CARBUTT, SHOWING THE LACK OF OSSIFICATION.

* * * *

The chief events of the year, however, have undoubtedly been the photographing of the invisible by means of the so-called X-rays and the portrayal of motion on a screen to large audiences. The general public has manifested great interest in both of these photographic achievements, and this interest has been fostered by the magazines and daily papers, quick to reflect, and even to mould, the direction of public thought. The popular enthusiasm aroused by Professor Röntgen's announcement, that substances hitherto considered visually and photographically opaque are transparent, photographically, to certain rays, and that this transparency may also be ocularly demonstrated, has waned considerably; but medical men, electricians and scientific photographers generally have practically applied the principles enunciated by Röntgen and have perfected the details to such an extent that the time of exposure necessary has been reduced to a matter of seconds. The surgical profession recognize in this harnessing of electricity to photography a means of positive diagnosis that is of the highest utility.

Many wonderful pictures have been made, the most interesting, of course, being those of the human body. Shot, bullets and needles have been located, fractures have been examined, and it is now stated that, by the aid of X-rays, a positive conclusion may be reached as to death, seeing that dead flesh offers more resistance to the passage of these rays than the living. Röntgen-ray laboratories are to be found in many of our large cities, and there is little doubt but that public hospitals will soon be equipped with the means of producing these rays.

* * * *

Following up the idea of the penetration of the opaque by the X-rays, an attempt has been

made to convince the photographic public that by the concentration of the mind on a particular object, an image of that object may be obtained on the photographic plate. The height of absurdity has been reached by a professor in this country who, as the story runs, stationed seven men in front of a camera and told them to think of the cat. The thoughts were brought to a focus in some unexplained manner, and on the developed plate was found "a collective psychical image, which is none other than the astral cat in its real essence." Such nonsense is on a par with so-called spirit photography, and is unworthy of serious consideration.

* * * *

The kinetoscope has for some years been a familiar object. It was the successor of the zoetrope, and the production of roll films, due to the demand of the amateur photographer for a compact, portable means of making many exposures without recourse to a darkroom, made it possible. A series of pictures is made in rapid succession on a long strip of sensitive celluloid film. When a print or transparency is made from this band of negatives and caused to pass before the eye rapidly, the motion of the original is reproduced. That is, in the negative band there is a series of separate pictures, each individual picture portraying the object at a given fraction of a second. These, when passed rapidly through the viewing instrument, give to the eye the sensation of one picture in which the objects pass through the same motions as the original subjects. The exhibition of such pictures on a small scale in the kinetoscope was a comparatively simple matter. Defects were hardly noticeable. The projection of these pictures on the screen, however, was attended with no little difficulty. Here the picture is enlarged to life size, and all the defects are glaringly apparent. Better films, better negatives, more accurate register and a dozen other things became necessary. To-day, however, these difficulties have been very largely overcome, and the animated photographs are extremely popular. From the historian's point of view much has been gained. The perfection of the phonograph and the vitascope gives us a means of preserving for posterity an absolutely accurate record of important events.

* * * *

The reproduction of color now absorbs the attention of a large class of workers. No little sensation was caused by the announcement that M. Lippmann, of the Sorbonne, Paris, had succeeded in obtaining pictures in color directly from the objects. A sensitive plate, of practically grainless coating, is attached to a tank of mercury in such a manner that the film and mercury are in absolute contact. The exposure is then made and the plate developed and fixed. Under certain conditions an image in colors is produced. This, however, is only visible at certain angles, just as the image in a daguerreotype, and the results cannot be said to give any encouragement to the idea that a practical process has been devised. Of more importance is the indirect method referred to above, by which a negative is made through a screen ruled in colors. From this negative

SECTION OF A ROLL FILM FOR A VITASCOPE.

a positive is made, which, when backed up with a ruled colored screen, yields a colored picture closely resembling the original.

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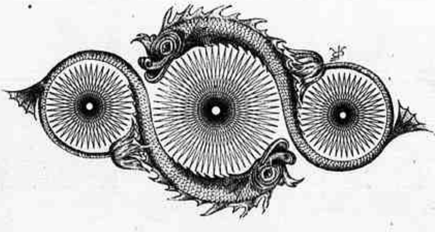
The photograph and radiograph reproduced with this article were made from a mummified hand supposed by good authorities to have belonged to an Egyptian princess. The hand is unquestionably between three and four thousand years old. It was obtained by an American lady from a fakir, near the Tomb of the Kings, Thebes, in 1892. The fakir had surreptitiously taken it when the tomb in which it rested was discovered and opened a long time before. For years he had kept it hidden, until his greed overpowered him when a purchaser came who consented to pay an exorbitant price. The hand was then covered with burnished gold, just as it had been found. At first the purchaser felt that she had made a fine bargain. But after she brought her treasure home she heard stories repeatedly of "how these things are manufactured." "It is a modern make-up," said one comforting friend. "It is but a mass of pitch mixed with pieces of refuse mummy-cloth, with new finger-nails stuck in," said another expert. This somewhat disgruntled the owner of the "genuine hand of an Egyptian princess," and she prized her purchase less and less as the years went on. Reading of the discovery of radiography, by Professor Röntgen, she learned, too, that while the X-rays pass through glass with difficulty, they would ignore pitch as if it were but so much air. "If this hand," she said to herself, "is that of a mummy, the X-ray will reveal the bones within it; if it is only pitch, there will be no 'find' of bones." To set at rest all doubts, she made the test. The gold covering was removed. The hand was then in turn photographed and radiographed, with a highly satisfactory result.

* * * *

Much valuable work has been accomplished during 1896, and many indications have been given of lines along which further progress will undoubtedly be made. The greatest assistance in all this research work is rendered by amateur photographers, who have the leisure, means and desire to delve further into the mysteries of nature. In nearly every large city there are photographic societies whose avowed object is the encouragement and advancement of photography. A systematic study of some particular branch of the art by such societies would undoubtedly result in the general increase of knowledge regarding photography and a consequent wider application of this most fascinating of hobbies.

FREDERICK J. HARRISON.



THE FUTURE OF ELECTRICITY

TAF

Opinion of Edison On the Discoveries to Be Made In 1897.

Believes That It Will Not Be Long Before Man Will Fly.

CHEAPER ELECTRIC LIGHT.

To Thomas A. Edison the field of electricity seems full of promise for the coming year. He expects that 1897 will see giant strides in electrical science, and that the indurtry of inventors will cause many changes in the mode of living. That much he said to a New York World reporter and by the way of explanation added:

"One of the things which will mark an advance in the year 1897 will be the perfect phonograph. Yes, we have got that at last, though considerable time has been required in which to get it. But the time hasn't been wasted. We've got a phonograph now that will astonish the natives. We have it upstairs, but there are some finishing touches to be put to it before it is placed before the public."

By "upstairs" Mr. Edison meant the top floor of his laboratory in Orange. Visitors to the laboratory are never permitted to go up there. Mr. Edison made an exception in favor of the Sunday World and gave the reporter an opportunity to hear the new and perfect phonograph.

"You notice," he said, "that there is no tinniness of twang about the sound that comes from it. There is the full, round tone of the piano reproduced. That has been our hardest struggle—to reproduce the exact tones of a piano. With a band of music we had no difficulty."

It was as Mr. Edison said. The full, perfect tone of the piano issued from the phonograph, and the reproduction of the human voice was exact.

"We'll have that before the public early in the coming year," said the wizard, and then he returned to the original subject by remarking:

"There is a promise that the flying machine will become something more than a guess in the year that is now before us. It's true that Lilienthal, the only man to try his flying machine, was killed by it, but I believe that we can get close to the real thing I don't know just what form it will take, or if it will be altogether practicable, but I do believe they'll arrive at a definite result in that direction.

"The new year is going to see some changes in electric lighting. That form of lighting is going to be made cheaper, which is something those who use the incandescent system of lighting will be glad to hear, even if it doesn't make the stockholders happy. The cheapening will occur in the initial process of producing the current. What has made the electric light cost so much up to the present time is the fact that we haven't been able to produce it without the intervention of the steam engine.

"The idea has been all along to make the electric light so cheap that it would supersede gas and all other illuminants and become the one universal light. That point we are approaching rapidly. We'll do away with the steam engine before long and get electricity from the coal itself. When we get to that we'll make another change in the economic conditions. We'll have gas for fuel altogether then.

"When the electric light becomes cheaper it won't pay all the gas companies to make gas for illuminating purposes. Some of them, maybe more, for all I know, will then begin to make gas for fuel. It doesn't cost anything to make gas for fuel—that is, it doesn't cost much as compared with what it costs to produce gas for illuminating purposes. The gas companies have pipes, already laid and running into the houses, and they won't be long in seeing their opportunity. They'll have to come to it sooner or later, and the first one in the field will probably make the most money. Gas companies are not formed for the purpose of giving people with throat trouble a chance to inhale the odor of the gas works. The year 1897 will see electricity more generally substituted for steam for power. The current will take the place of steam because of the great flexibility of electricity. If you want power here, there or anywhere, a man comes along and puts in a motor of five or a hundred horse-power, just as you want it. You can have it where you couldn't put in steam at all—down in a corner or anywhere. And that's why electricity is going to push out and supersede other power.

"Of course, if we should have a war with Spain, that would stimulate inventors and make many startling applications of electricity. But we won't have a war, eh?"

NOTHING IN IT

SAYS M. E. INGALLS

Cincinnati, O., Jan. 1.—When the attention of Mr. M. E. Ingalls, of the Big Four railroad, was called to a published rumor that he was to be promoted to succeed the Hon. Chauncey M. Depew, of the New York Central road, and that Depew was to receive a first-class diplomatic appointment from McKinley, he frankly and quickly replied:

"There is not anything it it so far as I am concerned. Cincinnati can not get rid of me so easily as that," and the business president closed the incident with a cheery "goog-bye."

Filed: "Edison, T.A.—
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IN CENTS A WEEK.

A BIG MAN IN TOWN

Edison, the Wizard of Menlo Park, is in Catasauqua.

INTERESTED IN A WEIGHTY SCHEME

It May Revolutionize the Mining of Iron Ore and Render Poor Ore Profitable—Catasauqua Has a Sudden Increase in Population—News Notes.

Thomas A. Edison, the "Wizard of Menlo Park, is in Catasauqua, and the denizens of that ancient but nevertheless bustling borough gaze with mingled awe and reverence upon the man whose mighty brain is the Aladdin's lamp of the Nineteenth Century, with results a great deal more permanent and substantial than those which greeted the rubbing of the genii's illuminant. The Crane Iron Company lately purchased about 1500 tons of briquettes from the Edison mines, near Lake Hopatcong. These briquettes weigh about a pound or so and consist of ore compressed into a circular shaped disc. The Edison mines, when in full operation, have a capacity of 5000 tons of ground ore per day. The ore is all of a low grade and through the agency of a magnetic separator the ore is extracted from the rock, which has been reduced to a powder, and the ore called a "concentrate." Out of 5000 tons of ground rock the result is about 250 tons of concentrate. This concentrate contains about 60 to 65 per cent. of pure ore. On Friday the Crane Iron Company commenced testing the ore and Mr. Edison, accompanied by one of his assistants, Mr. Frederick Ott, is anxiously watching the result of the tests. Should the ore be all that is claimed for it this new method of mining will revolutionize the present method of mining, particularly in regard to the low grade ore found on the Lehigh Mountains. The leanest kind of ore can be worked at a profit under the Edison method—and the day may come when our Lehigh Mountains, rich as they are in minerals, may, under the touch of Edison's genius, pour out their hidden wealth and once more place this county, where she was before, in the front rank of iron ore producing and iron manufacturing counties. The results of the experiments now going on at the Crane Iron Company's furnaces are awaited with an interest by no means confined to the company alone.

Harry Hall, superintendent of the Carbon Iron and Steel Company, of Parryville, was in town yesterday.

OUR X RAY TUBES

ARE THE BEST THAT CAN BE MADE.

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FOR USE WITH COILS HAVING EXTRA HEAVY SPARK CAPACITY

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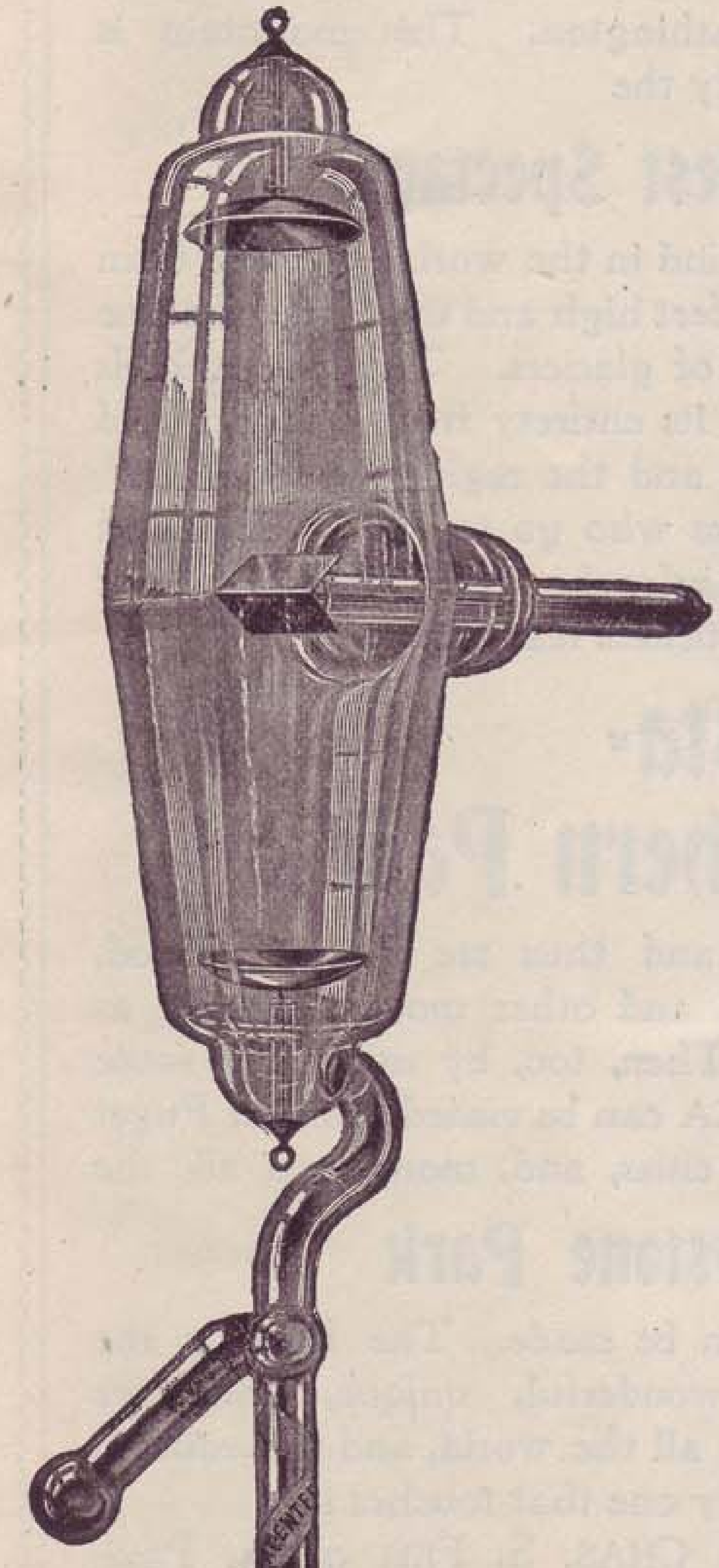
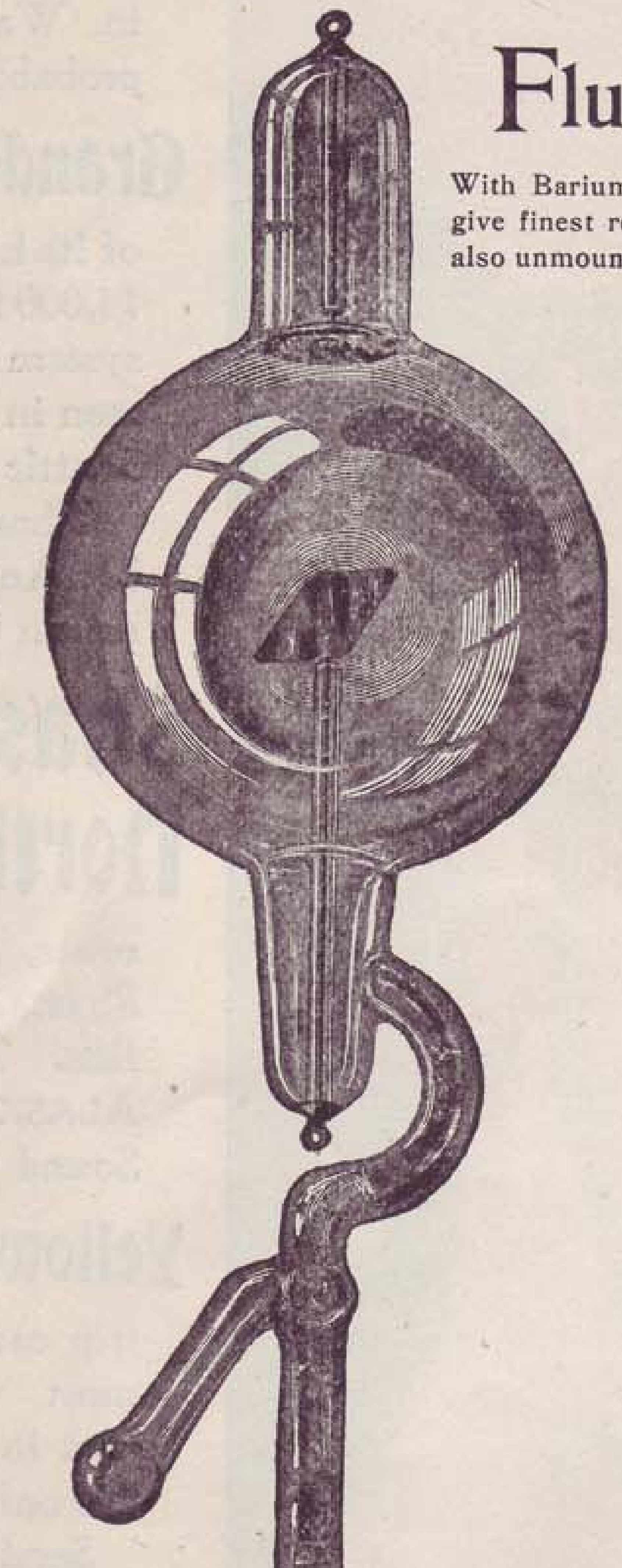
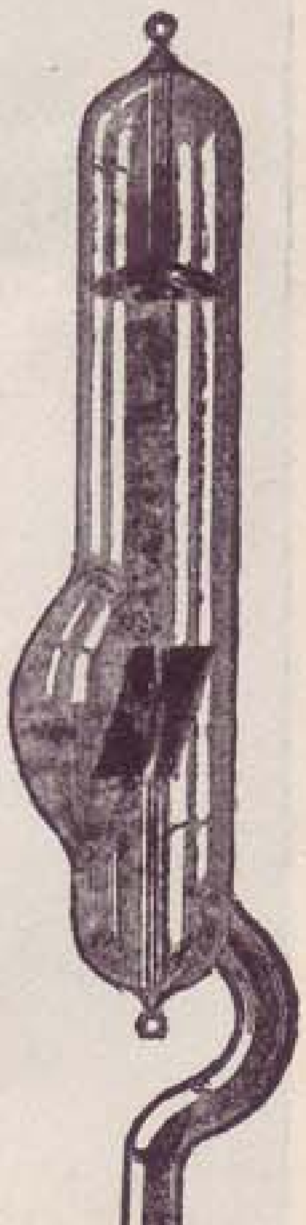


THOMSON DOUBLE-FOCUS TUBE, for high frequency coils.



FORM R5—Single-focus X Ray Tube, for induction coils of 4-inch to 12-inch sparks.



FORM G2—Single-focus X Ray Tube, for induction coils of 4-inch to 6-inch sparks.

Miniature Lamps, Candelabra, Decorative, and Battery, for all Purposes.

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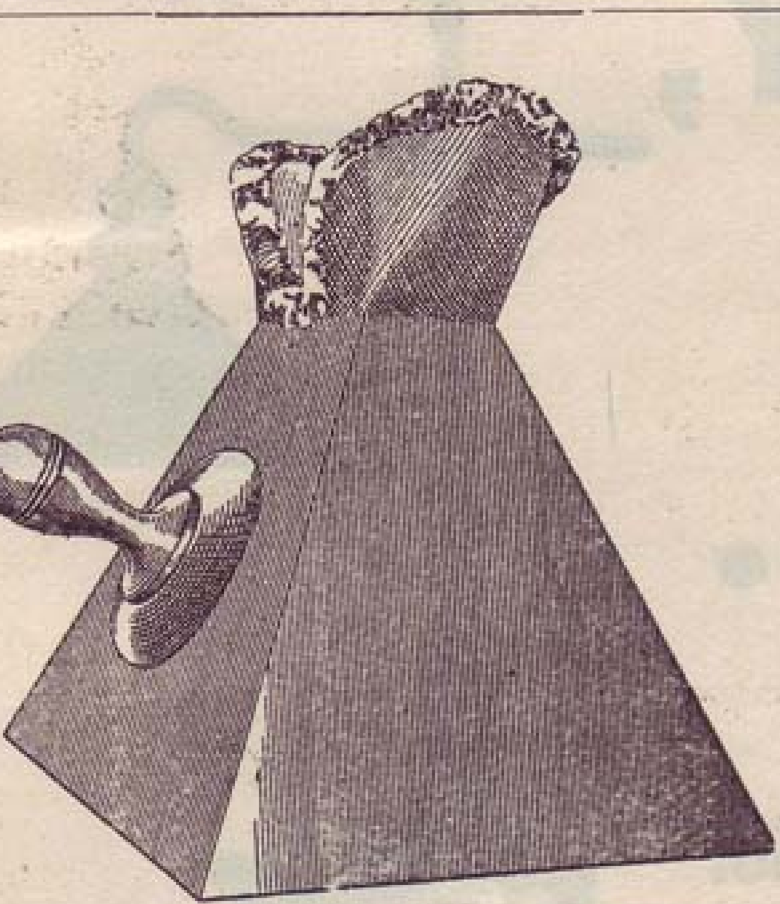
FLUOROSCOPES AND SCREENS



of the recently discovered Fluorescent Crystals are being used by a large number of physicians, hospitals and experimenters, in place of tungstate of calcium and other salts, as they accomplish the result of showing each image undimmed by previous exposure or phosphorescence, make clear the most vague shadows which can not be traced when calcium of tungstate is used, and are absolutely instantaneous in effect.

A leading scientist says: "I find the Fluoroscopes and Screens of this Crystal an improvement over all others that I have used."

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Electro-Therapeutics.

BY

GEORGE ADAM, M. D.

Professor of Therapeutics and Electro-Therapeutics, in the College of
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Author of Monographs: "From Ether to Physiologic Unit"; "The
Physiologic Unit"; "Gynecological Electro-Therapy"; "Theoretical Considerations of X Ray Energy"; "Galvanic Current"; "Medicinal Vibration"; "Cataphoresis";
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"The second tube possesses a much lower resistance (55,000 ohms) for currents of less potential and for gynecological uses. The fluid in either tube, selected at will by a switch, regulates the dosage by means of an adjustable rod regulated at different heights of the column."

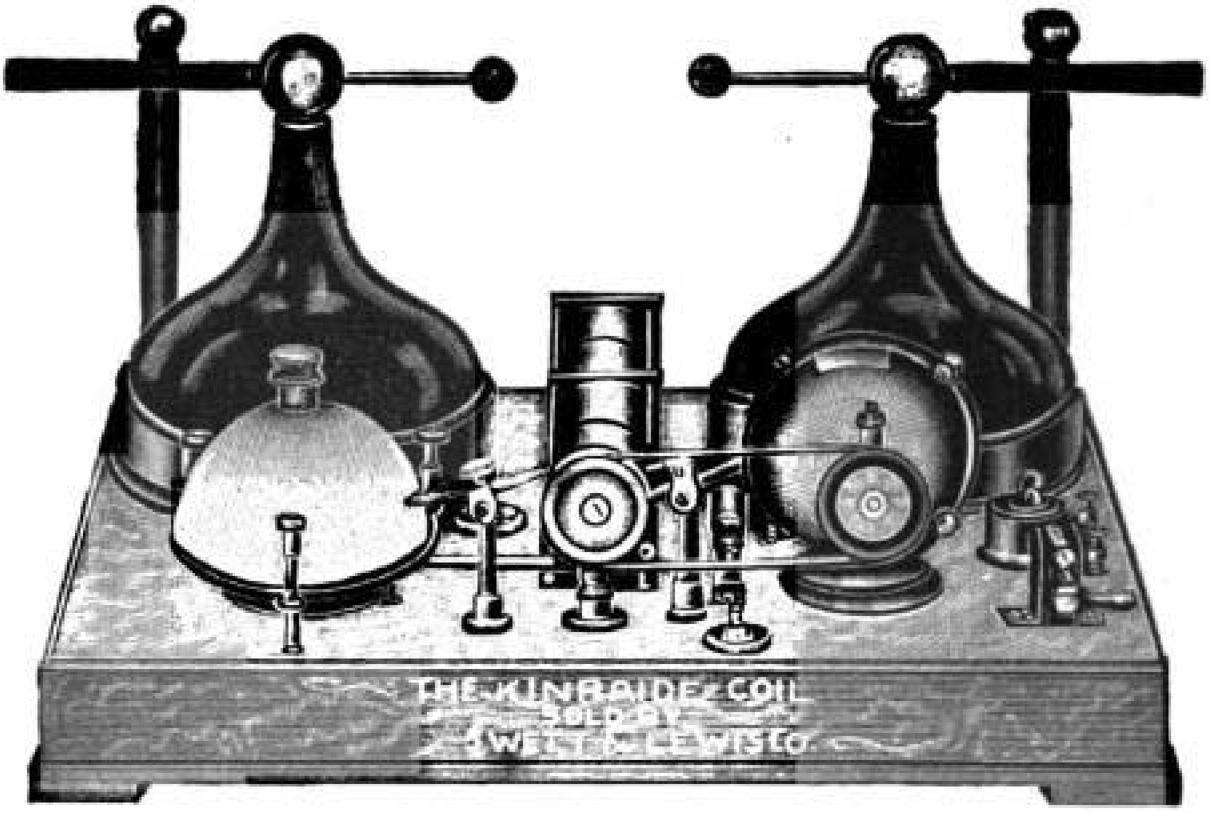

Fig. 48.
Kinraide Roentgen Ray Coil.

The Massey Current Controller. The Massey current controller consists of a slate disc roughened to retain a graphite coating. When the arm or brush is at the point marked "start" (Fig. 49) the circuit is open. When it is connected with the graphite point the circuit is made, but the resistance is great. As the handle is turned the resistance is lessened by an increase of the cross-sectional area of graphite coating and the current is increased accordingly.

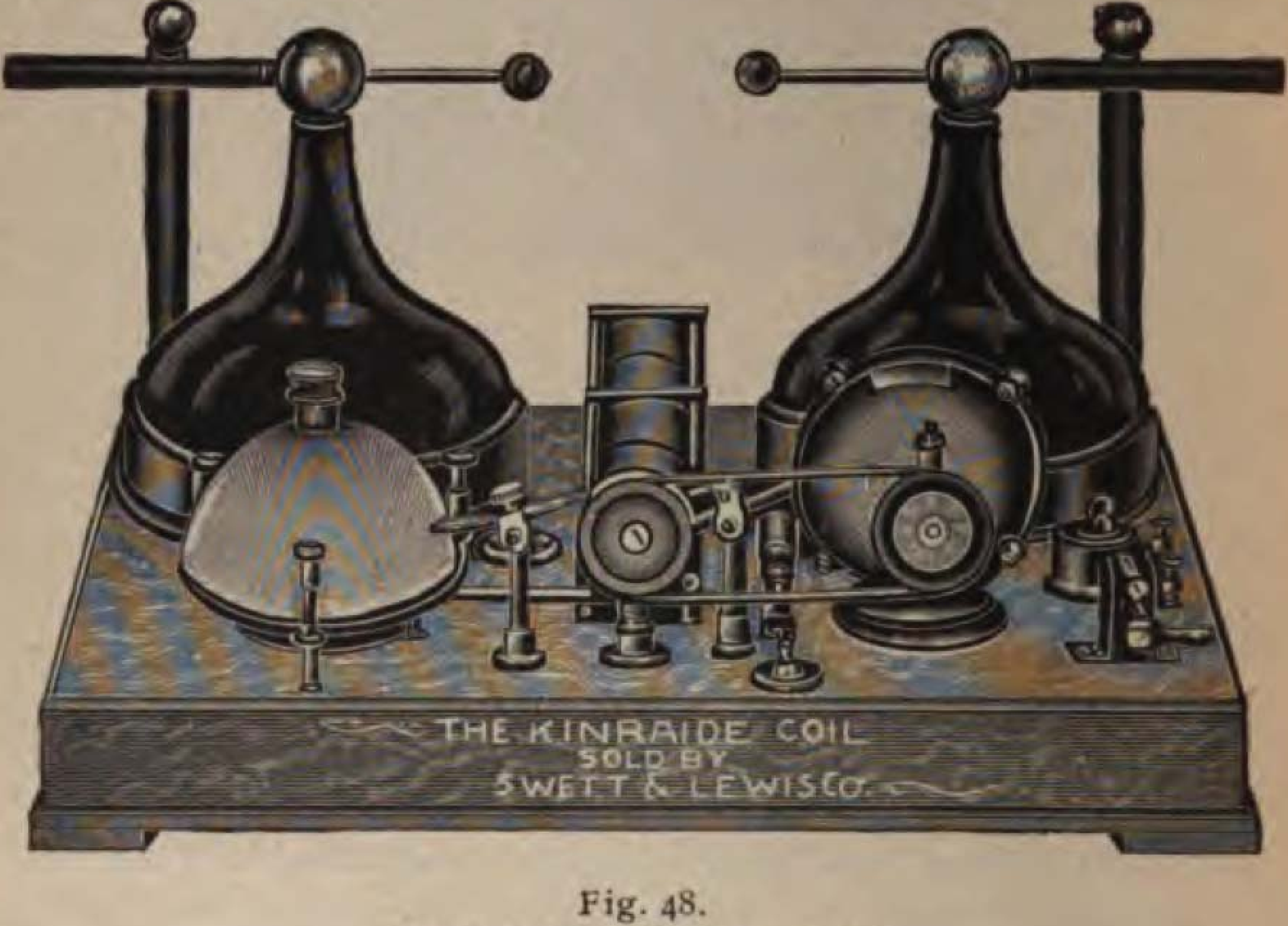
THE KINRAIDE COIL
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Fig. 48.
Kinraide Roentgen Ray Coil.

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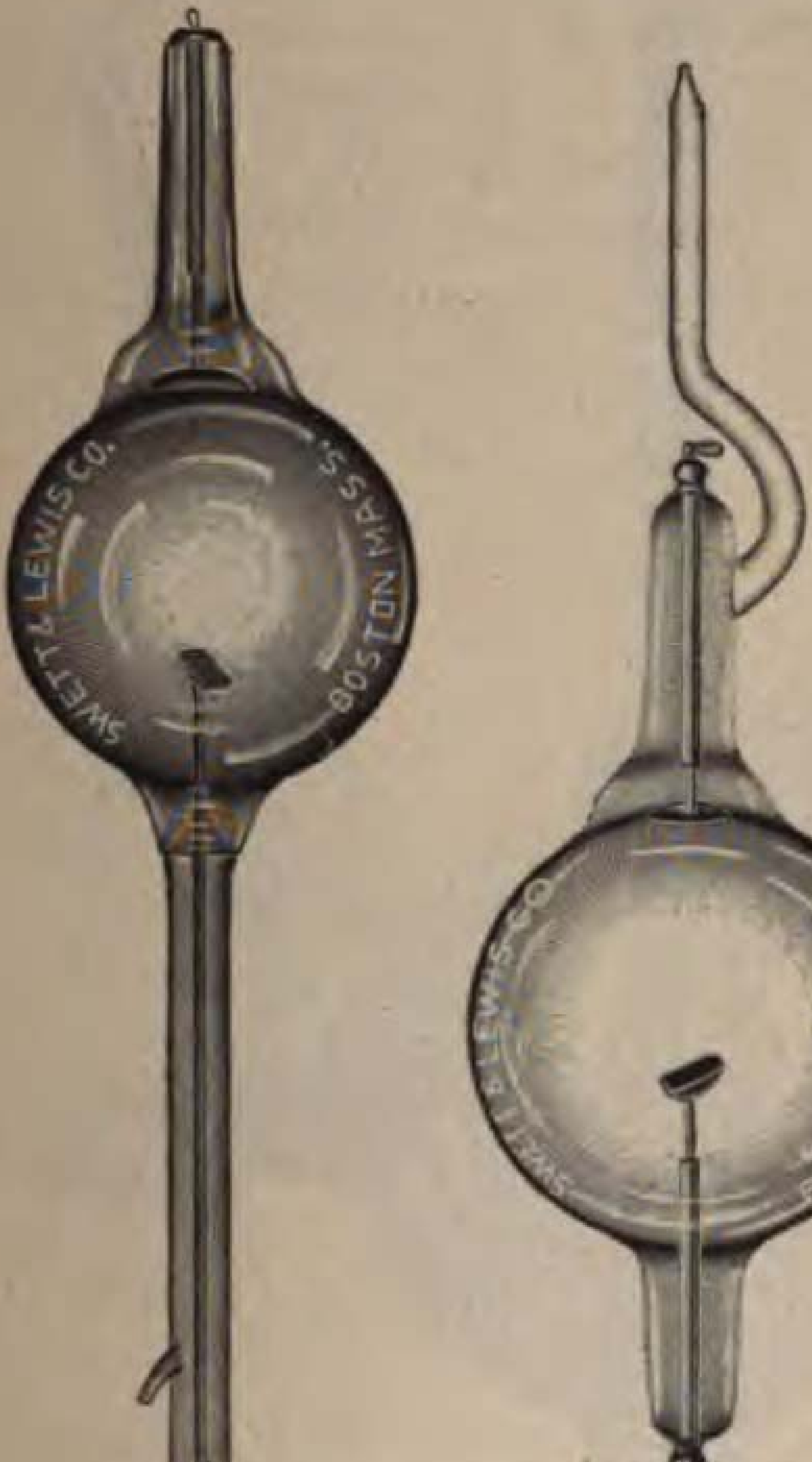
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Fig. 57.
X-Ray Tubes.

16x36 inches long, is shown herewith. When the direct or alternating current service is available, it can be connected to same, and where these are not available, an electric runabout, delivering a current at about 80 volts, may be used. For treatment work a 6-volt storage battery and mechanical vibrator may be substituted. During the past four years this outfit has been called into service by a number of Chicago radiographers and has proven its practicability.

The second type of portable coil, the first example of which appeared in the Kinraide coil, employs a small step-up transformer, with condensers and Tesla coil. A special type of X-ray tube is required with these since the current is alternating or rather oscillatory.

The third type is known as a Tesla oscillator and consists of a vibrator coil with considerable inductance, a rather large condenser and a Tesla coil. The character of the discharge from this is the same as the second. For treatment work the apparatus is quite well adapted and weighing from 50 to 80 pounds, is quite portable, but for radiographic work its field is limited.

Interrupters.—In using the coil especial attention is given to the character of the interrupter employed.

Its purpose is to suddenly and completely break the current into a succession of impulses, which cause the iron core of the primary coil to become

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PROCEEDINGS

OF THE

Society for Psychical Research

PART XLVI.

JUNE, 1903.

PRESIDENTIAL ADDRESS.

Delivered on January 30th, 1903.

BY SIR OLIVER LODGE, F.R.S.

IN taking the Chair of this Society for one more year and giving a third Presidential Address, I think it desirable to treat the subject from a business point of view, and to consider on what lines the Society may profitably work in the future. It must be remembered that our primary aim is to be a Scientific Society, to conduct our researches and to record our results in an accurate and scientific manner, so as to set an example of careful work in regions where it has been the exception rather than the rule, and to be a trustworthy guide to the generation of workers who shall follow.

To be scientific does not mean to be infallible, but it means being clear and honest, and as exact as we know how to be. In difficult investigations pioneers have always made some mistakes, they have no immediate criterion or infallible touchstone to distinguish the more true from the less true, but if they record their results with anxious care and scrupulous honesty and painstaking precision, their mistakes are only less valuable to the next generation than their partially true generalisations; and sometimes it turns out, after a century or

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High-frequency Coils.—The high-frequency coils of Tesla, Kinraide, and others operate in a somewhat similar manner to the ordinary induction coil, but they are excited not by an ordinary electric current interrupted suddenly a few times a second, but by a series of very rapidly oscillating currents of perhaps several hundred thousand alternations a second. Owing to the exceeding rapidity of the oscillations of the primary current, these high-frequency coils can be made to give high-potential discharges with a comparatively small number of turns of fine wire in the secondary winding. They produce brilliant *x*-ray effects, but they give discharges which alternate in direction, and which are, therefore, not so well adapted for practical *x*-ray work as those obtained from a static machine or ordinary induction coil. The alternations of the discharge cause much wear on the Crookes tubes, and they produce sources of *x*-rays at other points than the target, thus impairing the definition of the tube. For radiographic purposes, therefore, the high-frequency outfits are not very satisfactory, though for therapeutic work they answer very well, except for the rapid destruction of the tubes.

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the primary is by direct measurement with an ampèremeter. The interruptions being very fast and even, the instrument does not have time in which to drop back to the zero point after the current has been broken and before it is again made, and the result is that in the small space of time between impulses the meter remains steady and gives a mean value of the current employed.

High-frequency coils excited by a series of currents of rapid oscillation are represented by the Kinraide type. While they fulfil therapeutic indications, the rapid alternations of the discharge in these coils do not give sufficient definition, as a rule, for good radiographic work.

Some of these coils are attached to portable apparatus supplied with storage cells, which has the advantage of being used in the patient's own house. These should contain at least from four to eight cells in order to supply sufficient voltage. Charging at a battery charging station is necessary from time to time, although a charge can be supplied from a primary battery or from the street main. Such a storage-cell portable apparatus is seen upon the right in Plate I.

TUBES.

How the Ray is Produced. The apparatus required in the production of the *x*-ray consists essentially of a vacuum tube of one form or another, and an electric apparatus for exciting the same by means of a high-tension electric current. The tubes are usually some modification of the type perfected by Sir William Crookes in his endeavor to demonstrate and validate his theory of radiant matter, at the time so bitterly combated by Lenard and other Continental physicists. In the original form the tube with which the rays were first produced and demonstrated consisted of a globe having fused into its substance two or more metal bodies communicating with its interior. When the air or other gas within was exhausted to a high degree of vacuum, phenomena of varying natures were observable within the tube upon the passage of an electric discharge between the metal plates. In these tubes the cathode stream emanating in straight lines from the

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cyanide of barium. Screens of the latter kind are less durable than others; they are injured by pressure, and should not be kept in a warm room; but each kind has its respective uses.

Tungstate of Calcium Screen. — Certain of the tungstate of calcium screens are phosphorescent as well as fluorescent — that is, in a dark room they retain the image of an object opaque to the rays for a moment after the tube has been shut off. They should therefore be tested in the following way before being purchased: —

After the physician has been long enough in the dark room to get his eyes into condition to see the fluorescence, the vacuum tube should be excited and the light from it should be excluded by covering the tube with a dark cloth, or by placing it in the box already described. A piece of heavy metal should then be placed under the fluorescent screen and held in the same position for a minute or two. While the physician is thus observing the screen, the current should be shut off from the tube. If the screen has simply fluorescent properties it will instantly become dark, but if the part protected by the metal remains dark, and the other portions retain any brightness, the screen has phosphorescent as well as fluorescent properties, and should be discarded. Mr. T. B. Kinraide, of the Spring Park Laboratory, Boston, Mass., has succeeded, by his careful and laborious investigation, in making tung-

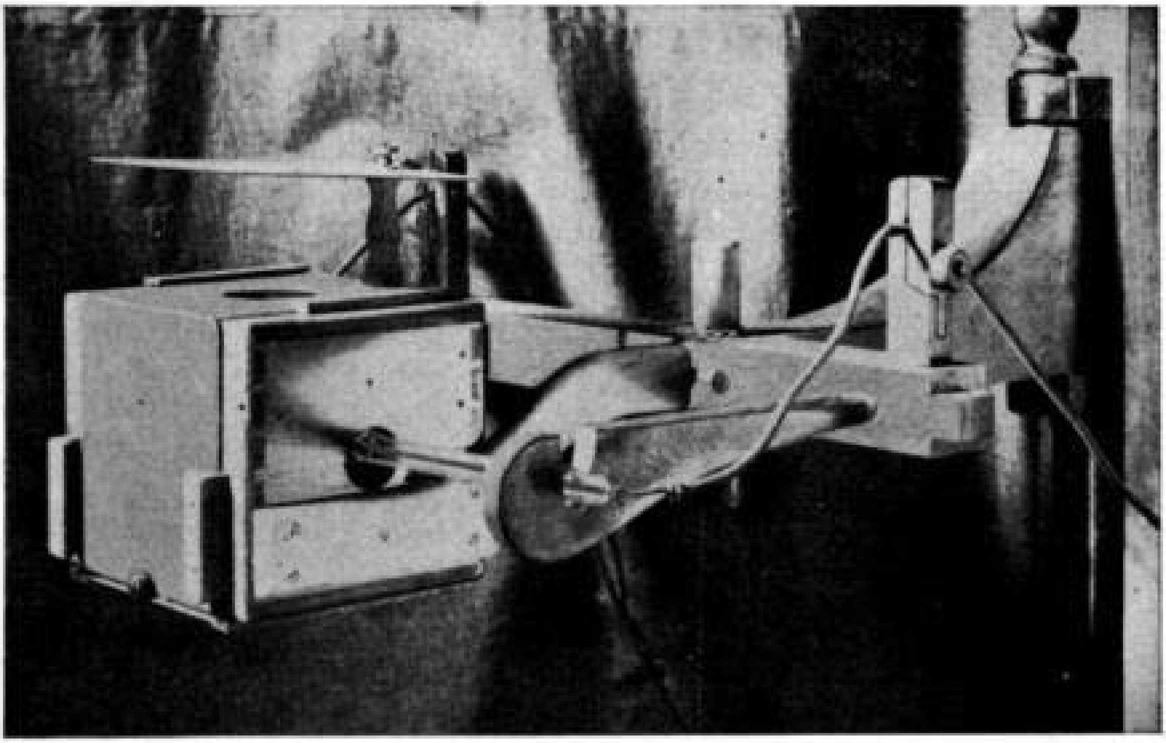

FIG. 47. Tube holder closed and ready for use.

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state of calcium screens that are without phosphorescence. They are very satisfactory, and I prefer them to any others that I have used.

Tungstate of Calcium Screen better for Examinations of the Thorax than Platino-Cyanide of Barium. — For examinations of the heart and lungs the character of the light from the tungstate of calcium screen is more satisfactory than that from the platino-cyanide of barium.

Platino-Cyanide of Barium Screen. — The platino-cyanide of barium screens which I had from Kahlbaum of Berlin were not as good as those I obtained in the United States from Aylesworth & Jackson (now Francis E. Jackson) of Orange, N. J. The first screens made by the latter firm deteriorated rapidly, but this difficulty has been partially overcome by them, and probably also by Kahlbaum.

Size of Screen. — The screen for examining the thorax should be at least 25 × 30, or, still better, 30 × 35 centimetres, so that both sides of the chest may be seen at once and thus be readily compared; for ordinary uses 20 × 25 centimetres. For examination of the neck a screen small enough to go between the clavicle and the jaw is necessary.

Sheet of Glass or Film of Celluloid. — A thin sheet of glass or a film of celluloid may be placed over the surface of the screen, upon which the outlines seen during an examination may be traced with a pencil. When glass is used the lines may be drawn with an ordinary pencil, if the glass is ground; if, on the other hand, the celluloid is used, or clear glass, a lithographer's pencil is necessary. (See Chapter III.)

FLUOROSCOPE

The fluoroscope is a pyramidal truncated box, the base of which is formed by the fluorescent screen and the top of which has an opening which fits over the eyes in a way to exclude the light from the room. (See Chapter III, Fig. 61.)

Comparison of Fluorescent Screen and Fluoroscope. — The fluoroscope, shown in Chapter III, Fig. 61, is a very convenient form of apparatus, but usually I prefer to make X-ray examinations of the chest with an open screen, the edges of which are strengthened by a frame. (See Chapter III, Fig. 50.)

PHOTOGRAPHIC PLATE

The general rules of photography apply in developing, fixing, and preserving the X-ray negatives, and therefore only a few suggestions will be given here.

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TECHNOLOGY QUARTERLY

AND

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VOLUME XII.

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MASSACHUSETTS INSTITUTE OF TECHNOLOGY.
1899.

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with the water divides, and the diversion of the smaller streams. Many interesting pictures were shown to illustrate the character of the country and buildings erected by the company.

A discussion followed. The meeting was then adjourned.

BOSTON, April 13, 1899.

The 525th regular meeting of the SOCIETY OF ARTS was held this day at the Massachusetts Institute of Technology with Mr. George W. Blodgett in the chair. Forty persons were present.

The proceedings of the last meeting were read and approved. Mr. Charles L. Norton, '93, Instructor in Heat Measurements at the Massachusetts Institute of Technology, and Mr. Osman S. Armstrong, Electrician, Riverside Press, Cambridge, were elected Associate Members of the Society.

The Chairman then introduced Mr. George L. Hosmer, of the Massachusetts Institute of Technology, who presented a paper on "The Middlesex Fells Geodetic Observatory."[1] This observatory is intended primarily to be used in giving instruction in the most refined methods of determining latitude and longitude, and secondarily to be used in magnetic and gravity observations. A description was given of the building and instruments, which include a transit of $2\frac{1}{2}$ inches aperture, 27 inches focus, a sidereal chronometer, chronograph, alt-azimuth, etc.

Observations have been made during the past term for the determination of time, and on latitude by Talcott's method. Arrangements have been made for the determination of longitude by telegraph connection with the Harvard observatory. The freedom of the observatory from vibrations, and its distance from magnetic disturbances, permits of much work that could not before be performed at any of the Institute buildings.

A discussion followed, and the meeting then adjourned.

BOSTON, April 27, 1899.

The 526th regular meeting of the SOCIETY OF ARTS was held this day in Room 22, Walker Building, Massachusetts Institute of Tech-

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[1] *Technology Quarterly*, June, 1899, pp. 135–144.

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nology. President Crafts presided. One hundred and fifty persons were present.

The minutes of the last meeting were read and accepted. It was voted, on motion of Professor Charles R. Cross, and seconded by Mr. G. W. Blodgett, that the President appoint a committee to nominate the Executive Committee for the ensuing year.

Mr. T. B. Kinraide, of the Spring Park Laboratory, Jamaica Plain, was then introduced and read a paper on "A New Form of Induction Coil." This unique form of induction coil of great power has been especially applied to the study of discharges by the aid of photographic processes, the plate being balanced on the top of the discharging globe in a dark room, and being developed after exposure to the light of the discharge. This process reveals in a striking manner the marked difference that exists between the positive and negative discharges. The apparatus was exhibited in operation, and photographic plates were shown by the lantern. The figures produced were of extraordinary beauty, and the delicacy of detail was brought out very clearly by the lantern.

A vote of thanks was tendered the lecturer for his very interesting and instructive paper. The meeting then adjourned.

ARTHUR T. HOPKINS, *Secretary.*

BOSTON, May 11, 1899.

The 37th annual meeting, 527th regular meeting, of the SOCIETY OF ARTS was held at the Institute on this day at 8 P. M., with Mr. Blodgett in the chair, and Dr. Bigelow as Secretary *pro tem.* Twenty persons were present.

The record of the previous meeting was read and approved. The Secretary read the Annual Report of the Executive Committee. It was voted that the report be accepted and placed on file.

ANNUAL REPORT OF THE EXECUTIVE COMMITTEE.

The first meeting of the SOCIETY OF ARTS for the present year was held on October 13, 1898. Fourteen meetings have been held, and the following papers have been read:

"Bacteria in Milk; Including their Rôle in Butter and Cheese Making," by Mr. S. C. Keith, Jr.

"Wool, with Practical Features that Enter into the Forming of a Wool Tariff," by Mr. Henry G. Kittredge.

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APPENDIX

TECHNIC OF RÖNTGEN RAY THERAPY

During the preparation of the present volume, I conceived the idea of addressing letters to some of the better known Röntgen therapists, asking that they supply the data of their technic on the blank enclosed for that purpose.

I was gratified by the cordial responses that my communications elicited, and interested in the widely divergent opinions, that have their adherents in this country and abroad.

The statements offered, in several instances, were so comprehensive that space was lacking to record the data. In those cases, an asterisk (*) has been placed, referring the reader to a detailed explanation in the addendum.

The following abbreviations have been employed, which, like the tabulation itself and the addendum, are arranged in alphabetical order.

COILS.

A-N.=Apps-Newton.
C.=Caldwell.
Fes.=Fessenden.
K. & K.=Kelley and Koett.
K.=Kinraide.
L.=Leeds.
L. & N.=Leeds and Northrup.
Q.=Queen.
R., G. & S.=Reiniger, Gebbert and Schall.
Ruhm.=Ruhmkorff.
R.=Röntgen.
R. M'f'g. Co.=Röntgen Manufacturing Co.
Sch.=Scheidel.
Sn.=Snook.
W. & B.=Waite and Bartlett.
Will.=Willyoung.

INTERRUPTERS.

D.=Davidson.
Gai.=Gaiffe.
K.=Kinraide.
R.=Röntgen.
W.=Wehnelt.

STATIC MACHINES.

Columb.=Columbia.
V. & T.=Van Houten and Ten Broeck.
Wag.=Wagner.
W. & B.=Waite and Bartlett.

VACUUM TUBES.

F.=Friedlander.
G. & B.=Green and Bauer.
G.=Gundelach.
M. & W.=Macalaster and Wiggin.
Mach.=Machlett.
Mon.=Monell.
M.=Müller.
Q.=Queen.
W. & B.=Waite and Bartlett.

ADDENDUM TO THE SYNOPSES ON TECHNIC IN RÖNTGEN RAY THERAPY

Baetjer, F. H. He uses 20 volts, ten amperes on two small coils; 110 volts direct current. He employs different makes of coils: Heinze 20-inch, Queen 9-inch, and Biddle 9- and 18-inch, respectively. He uses a hammerless interrupter on each 9-inch coil; the Wehnelt on the 18-inch. Vacuum tubes include: Queen, Heinze, Swett and Lewis, Müller, etc. He employs large (110 v.) and small (20 v.) coils; and believes that an erythema is necessary in all cases, except those of very superficial skin lesions.

Barnum, O. Shepard. Barnum uses his own penetrameter, and remarks that his average length of treatment is entirely too variable to state. He protects the healthy part by placing a shield around the tube and lead-foil on the patient.

Breneman, Park P. Breneman varies the frequencies of his irradiations, giving treatments twice or thrice weekly and then again only three times every two weeks.

Caldwell, E. W. Ten-inch coil of his own design, rotary mechanical break, 20 breaks per second; "break" lasts $\frac{1}{25}$ second and the "make" $\frac{1}{25}$. Uses the aluminium screen for deep parts. For lupus, low penetration and no screen. He writes: "I use any old tube that is not good enough for radiographic work or that needs seasoning for that purpose." He declares that the static machine, for X-ray work, is useless.

Dunham, Kennon. He believes that a French tube is best; he also employs the Friedlander and the Gundelach. He has not found self-regulating tubes valuable, unless personally regulated. He says that the distance of the anode from the patient's skin varies, because he brings the glass to within one inch of the cutaneous surface. His voltage (primary) is 40 to 90, with load; 115, without load; and he has the anode red hot (usually), before treatment is finished. He regards the spintermeter and penetrameter as inaccurate, so that he prefers a new method. He protects the parts very carefully, but not close to the lesion. An erythema, he asserts, is necessary in lupus, mycosis fungoides, epithelioma, etc. He often gives daily treatment; at other times only once in two weeks.

Franklin, Milton W. He estimates the degree of vacuum of the tube by both the spintermeter and the penetrameter; preferring Holzknecht's method of standardization of the electroscope and the Franklin electroscope for general use. It is his practice to cover everything with lead except the lesion. The best indication to cease the treatment is the presence of any inflammatory sign on the healthy skin; his only other rule is, when excessive sloughing occurs on an open lesion.

Freund, Leopold. For superficial lesions, a soft tube (Wehnelt-skiameter), 5–12 cm.; for subcutaneous and deep-seated lesions, a hard tube (Wehnelt-skiameter), 10–15 cm. In treating the more deeply seated affections, Freund is guided by the green-blue light of the tube; in superficial affections, by a deep yellow fluorescence. He emphasizes the question of individuality, idiosyncrasy, etc., and advocates repeated small doses until slight reaction—*i.e.*, swelling, redness, pigmentation, etc.—ensues. He protects the patient with lead-foil or mercurial plaster and urges the operator to seek his own protection in a lead apron, spectacles, etc. He believes that treatment should temporarily cease when inflammatory signs, with pigmentation, epilation, and subjective symptoms are evidenced. He formerly condemned the employment of Liquor Burowii as being an irritant in acute cases,[1] but recently he advocates the treatment, which I have appended, in his technic.

Gibson, J. D. Gibson brings the anode close to the affected area in cutaneous lesions, and as distant as 18 inches for deep-seated influence. Amperage for deep penetration, 5 to 10, superficial, 1 to 2. For pulmonary cases, he employs a quantity of rays equivalent to that required to take a skiagraph in from 30 to 60 seconds. He measures dosage by the fluoroscope and spark-gap. He ceases treatment at the appearance of an erythema or an elevation of temperature. He approves of the production of an erythema in malignant and superficial affections.

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[1] Elements of General Radiotherapy, by Leopold Freund, translated by G. H. Lancashire, 1904, p. 348.

Girdwood, G. P. Current of 220 volts from the street; in the hospital 110 v. For hospital use a 12-inch Biddle coil and a 10-inch Leslie Miller. In the office a 6-inch (Chadwick) mercury dip and a 12-inch Apps coil. He varies his interrupter according to his coil and tube, from 300 mechanical to 3000 electrolytic. He employs a voltage of 220 cut down by the rheostat to 200. He is guided in his dosage by a greenish-yellow fluorescence of the tube.

Grubbe, Emil H. A subdued fluorescence of the luminous hemisphere of the tube is his guide; the vacuum is estimated by the resistance of the tube, as compared with air resistance between the prime conductors of the generator. He protects the healthy parts by means of Grubbe's X-ray foil. He believes that an erythema is necessary in the treatment of all superficial lesions.

Hall-Edwards, J. He uses German and French makes of vacuum tubes, and finds the non-regulating best for radiography, the self-regulating for treatment. He uses all tubes, no matter what the vacuum, at from 4 to 12 inches. He employs the radiochromometer, radiometer, etc., for experimentation only. He protects the healthy parts by plaster of Paris masks and a bandage covered with lead-foil. He writes me that in all his varied experience—Officer in Charge of the X-ray Department of the Birmingham General Hospital and late of the Imperial Yeomanry Hospitals in South Africa—he has found nothing to relieve the painful, chronic dermatitis, from which he is a sufferer.

Hetherington, J. P. He uses his own water-cooled interrupter or the Kinraide, the number of interruptions in either being about equal to the Wehnelt. He uses a variety of vacuum tubes, among which may be mentioned: The Queen, Volt-Ohm, Friedlander, Wagner, Swett and Lewis, Müller, etc. He tells me that he prefers the non-regulating and the self-regulating, to the osmo-regulating, variety. For cutaneous lesions, he brings the anode as close as possible to the part, unless the affected area is very large; in deep-seated conditions, as low a vacuum as will penetrate to the desired depth. He only uses lead to protect special parts, such as the hair; and discontinues treatment at a commencing erythema, or disappearance of the lesion. He believes an erythema is necessary to obtain rapid results, or to remove hair. It is his aim to produce erythema in nearly every case.

Holding, A. The indication to discontinue treatment is a "slight erythema." He says that "a slight erythema may at times be necessary in superficial skin lesions, but even then it is to be avoided if possible." He believes that *prevention* is better than all the cures for X-ray dermatitis.

Kienböck, Robert. He approves of the Benoist-Walter radiochromometer, average penetration 4 to 6, mostly 5. He uses his quantimeter in conjunction with Sabouraud-Noiré radiometer for dosage, and for comparison by artificial illumination he takes advantage of Scheiner's benzine lamp. He believes that a complete treatment by massive doses, once or twice monthly, is the most effective method. He is much opposed to frequently repeated irradiations.

Laquerrière, Albert. The milliamperage in the secondary is measured by Gaiffe's milliamperemeter, the length of the spark by the spintermeter. The penetration is determined by the radiochromometer of Benoist, and the dosage by the radiometer of Sabouraud and Noiré. The occurrence of erythema causes him no fear, indeed he often looks for a certain determinate degree of it; he believes that its likelihood can never be rigorously excluded, as idiosyncrasy plays so largely the rôle. He asserts that an erythema is beneficial in certain rebellious cases of lupus and in some of the epitheliomata. The various kinds of apparatus devised by Gaiffe are much in vogue in France.

Leonard, Chas. L. Leonard uses, as protective measures, a lead-covered box, a lead-glass shield, and an aluminium screen. He believes an erythema necessary when the disease will not yield without.

Morton, Reginald. He advises the employment of the Apps-Newton coil. He finds that the best results in his work are accomplished by two ten-inch coils and one eighteen-inch. He estimates his dosage by the apple-green color of the tube,

with the anode dull-red. At the appearance of slight dermatitis he discontinues treat-
ment. Nevertheless, he believes that the more severe the lesion, the more necessary
it is to bring about definite but not severe reaction. Dr. Morton informs me that
the London Hospital, to which he is the radiologist, treats the superficial cutaneous
lesions, including rodent ulcer, in the department of dermatology; cases of malignant
and constitutional disease are cared for in the electrical department under his super-
vision.

Morton, Wm. J. His guide in dosage is the fluorescence of the tube only. He
doubts if an erythema is ever really necessary; asserting that in three weeks' time
a mild erythema usually develops, followed by tanning. He employs only high-
vacuum tubes, preferably old and "hardened"; these giving "a 'therapeutic' X-
ray, in contradistinction to the quality of the X-ray best adapted to making a good
skiagraph." He believes that his method is much safer as regards X-ray burns.

Newcomet, Wm. S. He estimates the degree of vacuum by the appearance of the tube and spark-gap. He believes the time to discontinue treatment is when the treatment is no longer needed, and that an erythema is not necessary. He remarks that the occurrence of erythema is not necessary—it is accidental.

Pancoast, Henry K. Pancoast uses the mechanical spring interrupter for therapeusis; the Wehnelt interrupter for radiographic work; the Queen and Gundelach tubes for superficial treatment; the Queen, Macalaster and Wiggin tubes for deeper work. With the mechanical spring interrupter and a 24-inch coil, his amperage is 2 to 3; on 18-inch coils it is usually more. He estimates the vacuum of the tube by equivalent spark length when the tube is known to be reliable and constant; otherwise he resorts to the Benoist scale in addition. He tells me that his average length of treatment is a very variable quantity: for the average case of epithelioma, 10 to 15 minutes three to five times per week. He protects the healthy parts by the diaphragm of the tube shield, lead-foil or wet leather. He remarks that treatment should be discontinued when it is certain that the condition has been cured, and that the production of an erythema is a poor and misleading guide. As a prophylactic measure against X-ray dermatitis alcohol with talcum powder or stearate of zinc is recommended. The above will also answer for burns of the first degree, or an evaporating lotion of lead water and laudanum may be used for a slight dermatitis. For burns of the second degree: dry powder; lead water and laudanum; zinc oxide ointment; or picric acid solution 1–1000. For burns of the third degree: zinc ointment, or picric acid solution. For pain: lead water and laudanum or orthoform. For burns of the fourth degree: the same; to be treated more as a surgical condition. Chronic ulceration of the patient, Pancoast regards as a surgical condition. In some cases picric acid has been satisfactory. If healing is obstinate, excise, allow the ulcer to heal, or skin graft, or suture the edges together.

Pfahler, G. E. He employs a 7-inch Leeds coil and a number of coils of the Röntgen Manufacturing Co.—9-, 15-, 18-, and 20-inch. The vacuum tubes that he prefers include: Heinze and Bauer, Green and Bauer, Müller, Friedlander, Machlett, Macalaster and Wiggin. He is of the opinion that a dermatitis or toxæmia is a danger signal for the operator, and that it is seldom necessary to produce an erythema except when irradiating superficial lesions.

Price, Weston A. He uses a large number of coils, interrupters, and tubes, but fails to give their make or names. The distance of the anode from the patient's skin varies; usually it is from 6 to 10 inches. He states that his vacuum tubes also vary very much in superficial, subcutaneous, and deep-seated conditions. "For my dental work," he writes, "I use very high amperage and very high penetration, modifying these with different conditions."

Rudis-Jicinsky, J. With the static machine, 200 to 300 revolutions per
minute for therapy, 500 for skiagraphy. Length of spark-gap, 18 inches (maximum).
In therapy he also employs a 12-inch coil with two layers of primary connection in
series; interruptions, 10 per second; primary current, 2¼ amperes; direct current,
110 volts. For superficial lesions he is guided by a yellow-green fluorescence of
the tube; for deep affections, by what he terms "a perfect green." He varies his
length of treatment "according to each individual case, the condition of the patient,
and the condition of the tube." He informs me that in his belief all "deep" cases
should undergo a "tanning," and that the production of an erythema is only justifi-
able in a few obstinate diseases.

Schamberg, J. F. He uses Queen, Müller and Gundelach (regulating) tubes. One-fifth to two-fifths milliampere with medium high tubes; three-fifths to one and three-fifths milliamperes for low tubes. For accurate dosage Schamberg depends upon Benoist's radiochromometer; regarding No. 3 as fairly exact for superficial lesions, and from 6 to 8 for the deeper varieties. The average length of treatment in cutaneous affections is 5 to 6 minutes twice or thrice weekly. He asserts that erythema, especially if it occur early following vigorous treatment, is an indication that the irradiations should be discontinued. It is his belief that in ordinary cutaneous affections, such as acne, an erythema is not a *sine qua non*, but that its production acts as a remedial measure.

Scott, J. N. Scott says: "I try to use the same tube on the same patient. Upon beginning treatment, I record the length of treatment, amperage, number of interruptions, spark-length that the tube will 'back up,' etc. I gradually lengthen the treatment until an erythema is evidenced, basing future treatments on the above data." He irradiates epithelioma every day, and deeper growths every second or third day. He protects the patient by a metallic box which has adjustable openings for the passage of the rays. He believes that an erythema is necessary in every case, except when the eye is involved.

Shober, John B. He judges of the dosage by a whitish-yellow to a light green fluorescence of the tube; the anode normal to cherry-red. He estimates the degree of vacuum by the spark-gap on the coil and tube, the amperage in the primary current, the degree of the fluorescence in the fluoroscope, etc. He discontinues treatment if the case is getting worse, instead of better ("toxæmia"). He says: "Of late I prefer to use Curie 300,000 radium bromide, 20 milligrammes in two aluminium capsules, 2 to 3 times weekly, from 1 to 3 or 4 hours; valuable in furunculosis, boils, carbuncles, moles, warts, nævi, epithelioma, sarcoma, etc."

Smith, J. F. Dosage is determined by a light to dark green fluorescence of the tube; "the heavy anodes," he asserts, "do not get red hot." He believes that the best time to discontinue treatment is at the appearance of any erythema, taking into consideration the duration and number of the exposures.

Stewart, Thos. J. For superficial conditions he uses a Queen tube or one that can be kept low. In his work he employs the Gundelach, Queen, and Müller tubes; using the first and last for therapy. He believes that the maximum quantity of rays is emanating from the tube when the anode is of a dull red color. He thinks it necessary to produce an erythema to determine the maximum individual dose.

Stover, G. H. Stover uses a great variety of coils, interrupters, and tubes. Among the coils may be mentioned: Heinze 12-inch, Scheidel 12-inch, Meyer 6-inch, etc. The vacuum tubes include Green and Bauer, Macalaster and Wiggin, Swett and Lewis, Müller, etc. In estimating the vacuum of the tube he takes into consideration the primary current, the appearance of the tube, and the spintermeter-gap. He gives ten minutes' treatment to cutaneous diseases and from 10 to 15 minutes' for subcutaneous and deeper affections. He believes that the best time to discontinue treatment is at the approach of cure or transient or definite erythema. He asserts that in lupus vulgaris and cutaneous epithelioma, the production of an erythema is necessary.

Walsh, David. Walsh writes me that of late he has not followed up the therapeutic aspect of the X-rays, beyond treating a few cases of ringworm, recurrent carcinoma, and rodent ulcer. He remarks that his publications contain much of his technic.

TECHNIC OF RÖNTGEN THERPAY.

I. APPARATUS.

Number	Name	Residence	A. Static or Influence Machine: 1. Variety and Make 2. Revolving Plates 3. Revolutions per minute			Diameter of the Plates		Length of Spark-Gap		B. Source of Current: 1. Accumulator, Capacity 2. Direct Current 3. Alternating Current 4. Transformer	C. Coil: Variety or Make	Length of Spark-Gap (Parallel)		D. Interrupter: 1. Mechanical 2. Mercury 3. Wehnelt 4. Caldwell 5. Simon 6. Interruptions per minute	E. Crookes Vacuum-Tube: 1. Non-regulating 2. Self-regulating 3. Osmo-regulating 4. Variety and Make
			1	2	3	Inches	Cm.	Inches	Cm.			Inches	Cm.		
1	Baetjer, F. H.	Baltimore, Md.								(2) 110 volts	H. Q. B			1,* 3,* (6) variable	2,* 3, G., Q., H. M.
2	Barnum, O. S.	Los Angeles, Cal.	W. & B.	8	120-360	30	75	16	40		Western	12, 16, 18	30, 40, 45	2, 3, (6) 120 to 1200	2, (4) M., F.
3	Breneman, P. P.	Lancaster, Pa.								(2) 110 volts	Q.	15	38	1. 2.	1, 2, (4) Q., M., G.
4	Caldwell, E. W.	New York, N. Y.								(2) 110 volts	C.	10	25	1* (6) 1200	G., M.*
5	Dunham, Kennon	Cincinnati, O.								(3) 115 volts	Sch., K. & K.	18, 12	45, 30	My own, (6) variable	1, 2, (4) F., G.*
6	Franklin, M. W.	New York, N. Y.									Will., W. & B.	8, 12	20, 30	3, 4.	2, (4) G., G. & B.
7	Freund, L.	Vienna								(2) 110 volts		10	25	3	2, 3, (4) G., M.
8	Gibson, J. D.	Denver, Col.	V. & T.	8	Vary	32	81			(2) 220 volts	K., W. & B.	10 12	25 31	1, K., 3, 4.	2, (4) M.
9	Girdwood, G. P	Montreal	Betz. W.	12	300	36 36	92 90	18	45	(Q.) *	Vary*			1, 2, 3, 4, (6) 300-3000*	1, 2, 3, 4.*
10	Grubbe, E. H.	Chicago, Ill.		16	50 to 100	30	75	12	30	(1) 14 v 30a-h. (2) 110 (3) 220.		40, 20	90, 50	1, 2, 3, (6) 120 to 3000	2, 3.
11	Hall-Edwards, John	England								(2) 220 volts	Coxe, home-made.	12, 15½	30, 4½	1, 2, 3, (6) D., Gal.	1, 2, 4.*
12	Hetherington, J. P.	Logansport, Ind.	Wag.	4	1200	30	75	14	35	(1) 10 cells 21 volts. (3) 100 volts.	Q., Sch., K.	18, 12, 12	45, 30, 30	K. and my own	(1) some, (2) prefer, 3, 4.*
13	Holding, A.	Albany, N. Y.								(2) 110, (4) valve, k.k.	W. & B., K. & K.	8, 12	20, 30	3, 4, W	2, (4) W. & B.
14	Jones, H. Lewis	London								(2) 100 volts		12	30	1, 2, 3	3
15	Kienböck, Robert	Vienna	Ebonite.	10	800-1200	22	55			(2) 110 volts	R., G. & S.	16	40	2, 3.	2, (4) M.
16	Laquerrière, A.	Paris								(2) 110 v.; (4) Gaiffe.	Gaiffe	10	25	(2) Gaiffe	2, 3.
17	Leonard, Chas. L.	Philadelphia, Pa.								(1) 10-20 volts	L. & N	4, 7	10, 17½	1	(2) Q., M., (3) G.
18	Marsh, Jas. P.	Troy, N. Y.								(2) 110 volts	Q.	12	30	(1) Queen	2, (4) Q., M., F.
19	Morton, R.	London								(2) 70 volts	A-N.	10, 18 *	25, 45	1, (6) 600-2000	2, 3.
20	Morton, Wm. J.	New York, N. Y.	V. & T.	15	300-600	32	80	12	30	(2) 80 volts	Will.	18-20	45-53	1, 2, 3, my own, (6) 3000-40,000.	3, (4) M., G
21	Newcomet, Wm. S.	Philadelphia, Pa.		6		26	65	12	30		L., Sn., Q.	18, 20, 12	45, 51, 30	1, 3.	1, 2, Q., M., F., G.
22	Pancoast, H. K.	Philadelphia, Pa.									R. Mfg. Co.	18, 24	45, 61	1, 3 *	(4) Q., G., M. & W.
23	Pfahler, G. E.	Philadelphia, Pa.								(1) 16 volts; (2) 110 v.	L., R. Mfg.Co.*	9, 18	23, 45	1, 3.	2, 4 *
24	Price, Weston A.	Cleveland, O.								(2) 110 volts		16	40	1, 2, 3, 4	1, 2.
25	Rudis-Jicinsky, J.	Cedar Rapids, Ia.	V. & T.	10	200-300 *	32	80	18	45		Sch., Ruhm.	20, 12, 8	50, 30, 20	1, 3.	2, (4) G., M., Mon.
26	Schamberg, J. F.	Philadelphia, Pa.								(2) 110 volts	Q.	20, 12	50, 30	1, 3.	4 *
27	Scott, J. N.	Kansas City, Mo.								(2) 110 volts	Sch., Fes.	20, 18	50, 45	1, 3, (6) 800.	1, 2, 3, (4) many
28	Shober, John B.	Philadelphia, Pa.								(1) 20 volts	R.	9	23	1	2, (4) Q
29	Smith, J. F.	Chicago, Ill.								(2) 110 v.: (4) Rotary-Mercury.	Sch.	12, 14, 22	30, 35, 55	2, 3.	2, (4) F., G., M. & W.
30	Stewart, Thos. J.	Philadelphia, Pa.								(2) 110 volts	Q., L.	12, 18	30, 45	1, 3, (6) 600.	2, (4) Q., G., M.*
31	Stover, G. H.	Denver, Col.												2, 3, 4.	2, 3, (4) *.
32	Walsh, David	London								(2) 200 volts	A-N.	12	30	2, D.	Bi-modal

TECHNIC OF RÖNTGEN THERAPY—Continued.

2. TECHNIC—Dosage.

Number—Continued	I. Vacuum Tube Employed			II. Distance of Anode from Patient's Skin						III. Equivalent Spark Length of Vacuum Employed						IV. Current			Spintermeter	V. Penetration	VI. Chemico-Physical	VII. Photometric Comparison by	
	Superficial	Sub-cutaneous	Deep-seated	Soft or Low Vacuum		Medium		Hard or High Vacuum		Superficial		Subcutaneous		Deep-seated		Primary Coil		Secondary Coil		1. Radiochromometer (Benoist) 2. Penetrameter (Walter)	1. Chromoradiometer (Holzneckt) 2. Radiometer (SabouraudNoiré) 3. (Freund) 4. Quantimeter (Kienbock)	1. Radio-Activity 2. Artificial light 3. Selenium cell (Ruhmer Levy) 4. Ionization (Franklin)	1. Fluorescence of Tube 2. Appearance of Anode 3. Thermometer (Köhler)
				Inches	Cm.	Inches	Cm.	Inches	Cm.	Inches	Cm.	Inches	Cm.	Inches	Cm.	Volt	Amp.	Milliamp.					
1	Soft.....	Medium	Hard ...	8	20	6	15	5	12½	1½	4	2-2½	5-6¼	4-6	10-15	......	5	....	......	....	....	....	1. Yes.........
2	Low	Medium	High....	5-9	13-23	8-12	20-30	12-30	30-75	2-3	5-7½	3-4½	7½-11	4½-5½	11-14	110	1½-24	....	......	2..............	....	....	....
3	Low	Medium	High....	6-12	15-30	9-15	23-38	12-20	30-50	3-6	7½-15	6-8	15-20	8-12	20-30	110	.....	....	......	2..............	....	....	1, 2 (red) .....
4	Low	Medium	High....	5	12½	12	30	20	50	1	2½	2	5	5	12½	110	3-6	1	......	2..............	....	....	....
5	Very soft	Medium	Hard ...	*	....	6-8	15-20	15-20	38-50	....	....	....	....	....	....	*	2-12	....	......	(1) 3 to 8	1, Approx.	....	....
6	Very soft	Soft.....	Medium or hard.	5-8	13-20	6-8	15-20	12-15	30-38	4-8	10-20	4-8	10-20	6-8 +	15-20 +	115	5-8	15-60	4-10	1, 2............	1, 2............	4..............	....
7	....	....	....	2-5	5-12	....	....	4-6	10-15	1½-2	3-5	2-3-4	5-8-10	4-8	10-20	110	3-6	....	......	*..............	3*..............	....	1*..............
8	Low	....	Medium	*	....	*	....	*	....	2-3	5-7½	....	....	3-6	7½-15	220	1-2* 5-10	....	*	2*..............	....	....	....
9	4½″-5″..	5″-6″....	5″-7″....	....	....	....	....	....	....	....	....	....	....	....	....	220*	.....	....	......	....	....	....	1*..............
10	Low	Medium	High....	2-5	5-12½	4-7	10-17½	6-8	15-20	1-3	2½-7½	3-5	7½-12½	5 +	12½ +	......	.....	3-15	*	*..............	....	....	....
11	Medium soft.	....	Hard ...	*	....	*	....	*	....	3-5	7½-13	4-6	10-15	8-14	20-35	60	5-15	1-5	......	(1) About 7	....	....	(1) partly, (2) red hot.
12	*	*	*	*	....	....	....	*	....	1½-2	3¾-5	2-4	5-10	3-5	7½-13	21	2½-5	....	......	2..............	....	....	1, (2) on some tubes.
13	Low	Medium	High....	3-6	7½-15	6-10	15-25	6-20	15-50	1	2½	2	5	4-6	10-15	80-120	4-8	0.5-2.0	......	(2) 4-6	....	....	....
14	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	.....	....	......	1..............	2..............	....	....
15	....	....	....	....	....	....	....	....	....	8	20	....	....	12	30	70	3	0.2-0.6	......	1*..............	2*, 4*..........	2*..............	1, 2............
16	....	....	....	6	15	....	....	10-12	25-30	1¼-2¾	3-6	1¾-2¼	4-7	2-4	5-10	......	.....	Gaiffe*	Yes	1..............	2...............	....	....
17	....	....	....	2-8	5-20	8	20	8-20	20-50	¼	⅝	1½-2	2¾-5	2½-5	6¾-13	20	4-10	1-6	¼-6	....	....	....	....
18	Low	Medium	High....	3	7½	5	13	10	25	3	7½	6	15	8	20	......	.....	....	Yes	....	....	....	....
19	....	Medium	Hard ...	4	10	6	15	8	20	4	10	5	13	6-8	15-20	70	2-8	1	Yes	....	....	....	1, 2* ....
20	....	....	....	*	....	*	....	*	....	7-12	17½-30	7-12	17½-30	7-12	17½-30	......	.....	....	......	....	....	....	1..............
21	Soft.....	High....	High....	4-10	10-25	4-10	10-25	10-20	25-50	1	2½	2	5	4	10	......	.....	....	......	....	....	....	1, (2) red......
22	G., Q. ...	Same ...	Q.M.&W.	7-9	18-23	8-12	20-30	12-18	30-46	½-1	1¼-2½	1-1½	2½-4	2-4	5-10	110	2-3*	*	......	(1) 3 superficial 6 deep.	....	....	....
23	Soft.....	Medium	Hard....	6	15	10	25	12-15	30-38	1½	3¾	2	5	3	7½	110	2-5	1	......	1	....	....	....
24	*	*	*	*	*	*	*	*	*	¼-1	⅝-2½	1½-4	3¾-10	1-10	2½-25	......	.....	....	......	....	....	....	....
25	Low	Medium	High, old	....	....	....	....	....	....	3-4	7½-10	4-5	10-13	5-6	13-18	110	2½	....	......	1, 2............	....	....	1..............
26	Medium low.	Medium high.	....	....	....	5-7	13-17½	12-15	30-38	....	....	....	....	....	....	110	5	*	......	1*..............	....	....	1*..............
27	Soft.....	Medium	Hard ...	8	20	10	25	18	45	1	2½	1-2	2½-5	2-4	5-10	110	3-8	....	Yes	1..............	....	....	....
28	Low	Medium	High....	6-10	15-25	10-12	25-30	12-18	30-45	½-1	1¼-2½	1½-2	3¾-5	2½-4	6½-10	20	2-4	....	......	....	....	....	1, 2* ....
29	Low	Medium low.	Medium high.	6-8	15-20	8-10	20-25	10-14	25-35	....	....	....	....	....	....	110	2	....	......	....	....	....	1* ....
30	Q.*	Medium soft.	Medium	6-8	15-20	8-10	15-25	10-15	25-38	½-1	1¼-2½	1-2	2½-5	2-4	5-10	110	5	Yes	Yes	2	....	....	1, 2*..........
31	Soft to	Medium	Medium	3-8	7½-20	10-15	25-38	15-30	38-75	....	....	....	....	....	....	......	3-6	....	......	(1) 1-4 or 6 B..	....	....	1, 2, partly....

TECHNIC OF RÖNTGEN THERAPY—Continued.

3. PRACTICAL APPLICATION.

Number—Continued	Dosage and Clinical Aspect					Röntgen Ray Dermatitis
	1. Do you vary the length of treatment?	2. What is your average length of treatment? How often per week?	3. Do you protect healthy part, and how?	4. What is the best indication to discontinue treatment? Is it a mild erythema?	5. When do you believe an erythema is necessary?	What is your treatment for the acute and chronic forms of the above?
1	Yes	5 minutes; thrice	Lead-foil	Yes	*	In the acute form, a non-irritating unguent, as lanolin, prevents incrustation and is strongly recommended. For deep, sloughing burns, clear up, and stimulate with the galvanic current. If rebellious to treatment, excise and skin graft.
2	Yes	Varies; daily to 3 weekly.	Yes *	Mild erythema	Malignancy	This depends entirely on the severity of the dermatitis and the idiosyncrasy of the patient.
3	Yes	*	Yes, shield	Erythema generally	Superficial cases	Discontinue treatment.
4		10; 1 to 3	Tin-foil	Yes	Lupus	Dry heat. Simple ointments, sparingly. Salicylic collodion for scales; for ulcers, argyrol (20 to 30 per cent. solution); cover latter with silver-leaf.
5	Yes	12 minutes *		Tanning sometimes.	*	I have none, nor do I know of any.
6	When indicated	5 minutes; 2 to 3	Lead *	* Yes	Very rarely.	Lime-water, lanolin, lard, equal proportions (Dr. C. W. Allen's formula).
7	Yes *		Yes *	*	*	Avoidance of the X-ray atmosphere. For acute cases, Liquor Burowii and 15 per cent. boracic lanolin—suspension.*
8	Yes	7½ minutes; thrice	Yes, for eye and hair.	* Very mild	*	Never had any case of dermatitis to treat. Have nothing specially adapted to recommend.
9	Yes	5–10; daily to monthly	Lead shield	Skin redness	Lupus *	Varies. If superficial and painful, I use liq. plumb. subacetat. dil.; much pain, lanolin with a trace of cocaine and surrounded by an oleaginous material on lint, the whole protected by absorbent cotton.
10	Rarely	10 minutes; daily	Yes *	Dermatitis	*	Acute: Cease treatment; allay itching with a saturated solution of sodium bicarbonate. Chronic: Cleanse with a saturated solution of potassium permanganate and apply plain sterile vaseline on sterile gauze.
11	Yes	5 minutes; thrice	Yes *	Slight dermatitis	Always	For the acute form, a lead lotion. Have found nothing satisfactory for the chronic form.*
12	Yes	3–5 minutes; 1–3 days.	Lead	* Prefer	Usually *	Castor oil and Basham mixture.
13	Yes	5 minutes; 3 times	Lead	* Yes		Acute: Lanolin and picric acid. Chronic: Excision and skin grafting for ulceration. Lanolin in cases of parched condition, for circulation and cutaneous nutrition. High-frequency currents, for stimulation of the circulation, locally.
14		10 minutes; twice	Lead-foil	Yes.		For the acute form, protection from air and mechanical injury.
15	Yes	Varies	Lead *		Usually	The usual methods in vogue.
16	Yes			*	*	The lesion should be unexposed and be kept away from the rays. The application of a thick ointment of the oxide of zinc. The effluve from a high-frequency machine.
17	Yes	10 minutes; thrice	Lead	? Yes	*	Stearate of zinc, with ichthyol 10 per cent., to prevent and allay dermatitis and itching. For chronic cases, sterile gauze and normal salt solution with orthoform for pain.
18	Yes	10 minutes; thrice	Tin-foil	Hyperæmia sometimes.	Skin lesions	Paint the part with an aqueous solution of resorcin (25 per cent.), once daily. For itching, immerse in hot water, the hotter the better. In the chronic form, removal of the patient from X-ray influence for a year or eighteen months.
19	Yes	15 minutes; 2–3 times	Lead	Yes *		Cessation of irradiation. Lead lotion.
20	No	20 minutes; thrice	No	Recovery *	*	Lanolin.
21	Yes	10 minutes; 1–7 times.	Lead	**	*	Meet the symptoms as they arise, the same as you would in any other condition.
22	Yes	Varies *	Yes *	*	*	The treatment recommended is a lengthy one, and is described fully in the addendum (*vide*).
23	Yes	10–30 minutes; 1–6 times.	Lead	Yes *	*	Discontinue X-ray therapy. Treat as any other burn. Avoid all irritating applications.
24						
25	Yes *	10–15 minutes; thrice.	Tin-foil	Yes	*	Olive oil, listerine, and bismuth subnitrate, equal parts of each.
26	Yes	5 minutes; 2–3 times.	Lead-foil	Yes *	*	Pain has been relieved, in a few instances, by an ointment composed of ten grains each of orthoform, resorcin, and calomel, in one ounce of cold cream.
27	Yes	9 minutes*	Yes *	Necrosis; no	*	No active treatment is recommended. Avoid the X-ray atmosphere. The operator is advised to remain in a room thirty feet from the tube, and to place himself behind an iron screen one-fourth of an inch in thickness.
28	Yes	15 minutes; 3–6 times.	Tube shielded	Toxæmia; no*	Usually	Had no occasion to employ any.*
29	Yes	5 minutes; thrice	Lead	*		Simple dry, or absorbent, aseptic dressings. Zinc oxide ointment.
30	Yes	10 minutes; thrice	Lead and glass shield.	Slight erythema	*	Avoid active treatment. Zinc oxide to allay the itching.
31	Yes *	10–15 minutes; thrice.	Lead	*	*	Acute: Removal from the exciting cause; soothing and antiphlogistic drugs and preparations. Chronic: Avoid the rays, developing fluids, and cold water; apply hot water, bland unguents, and mild high-frequency currents. For deep Röntgen ulcers apply caroid to slough and treat as local gangrene.

RÖNTGEN RAY TREATMENT CHART

No.

Name
Address, or Dept. and Ward
190

History
Age
Sex

Part affected, Extent, Duration, etc.

Appearances: Macroscopic

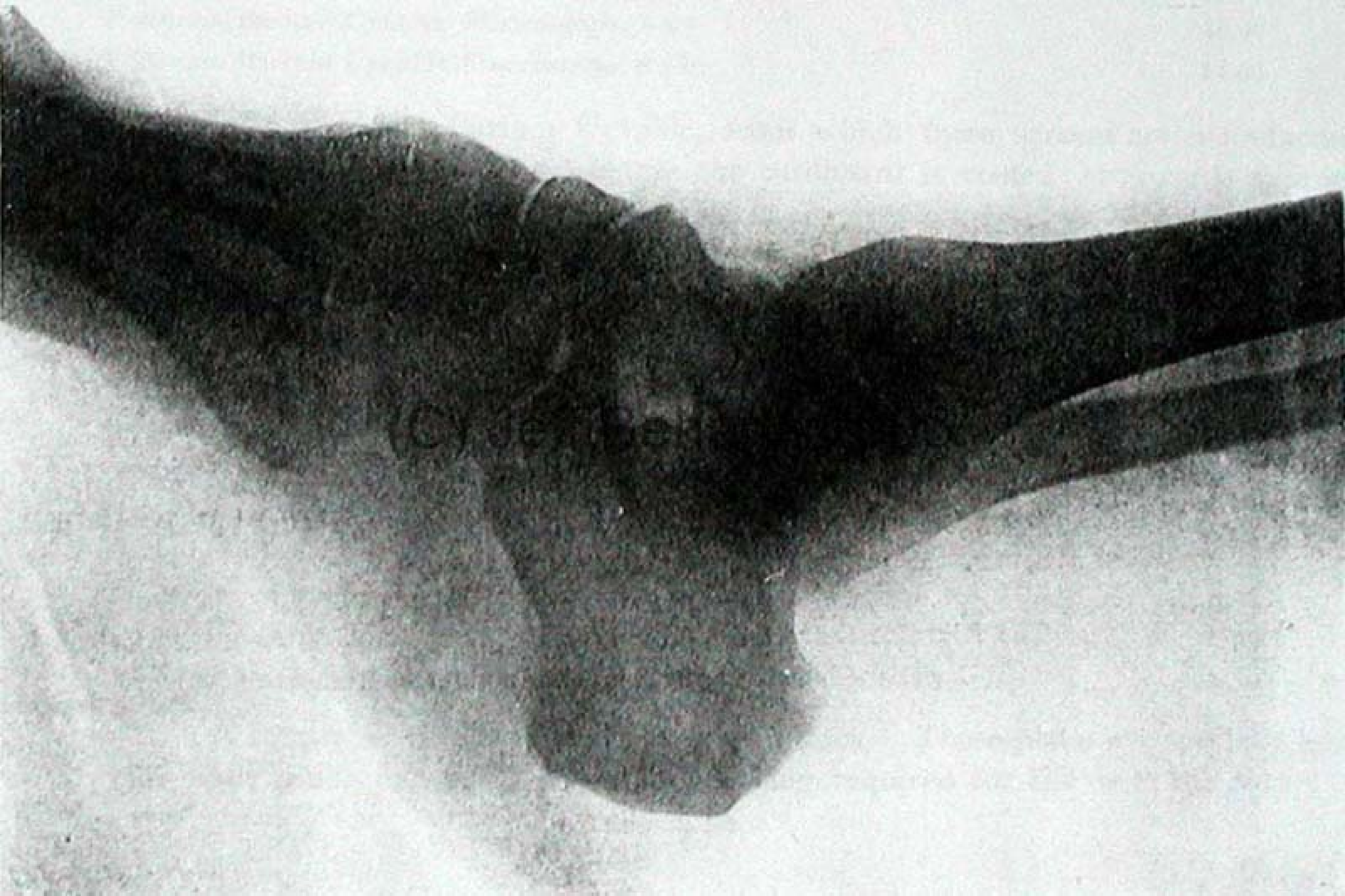
Appearances: Microscopic

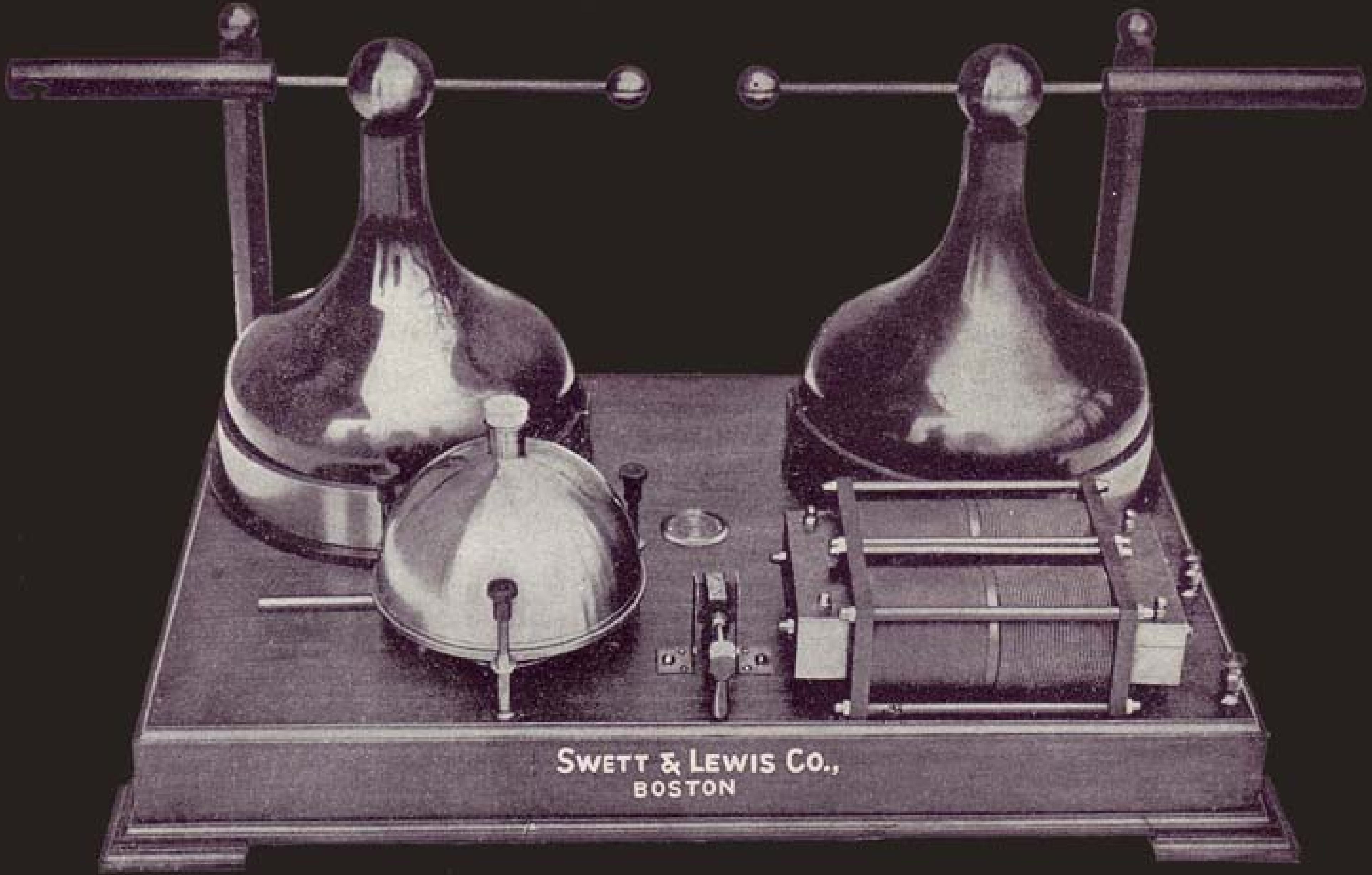
Diagnosis

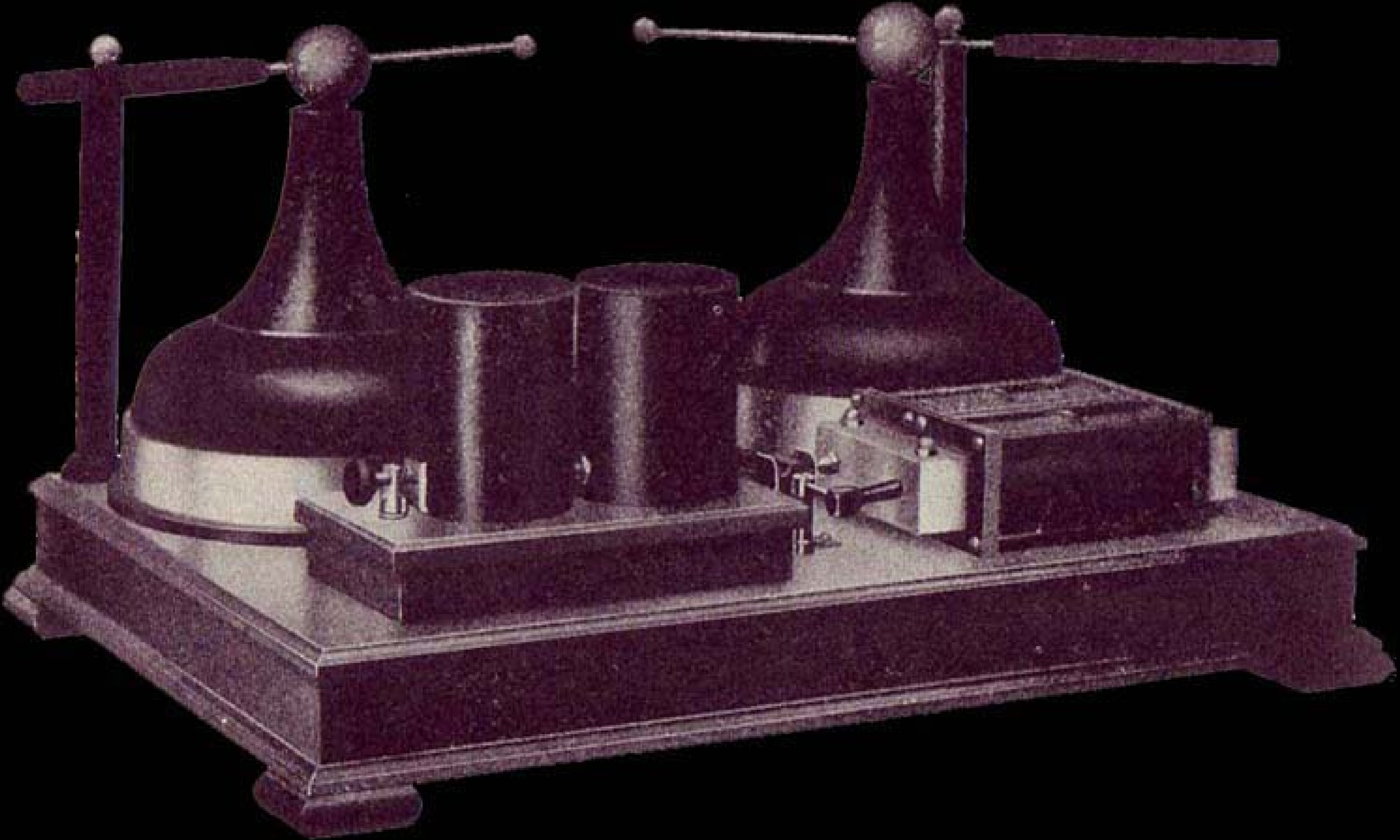
Previous Treatment

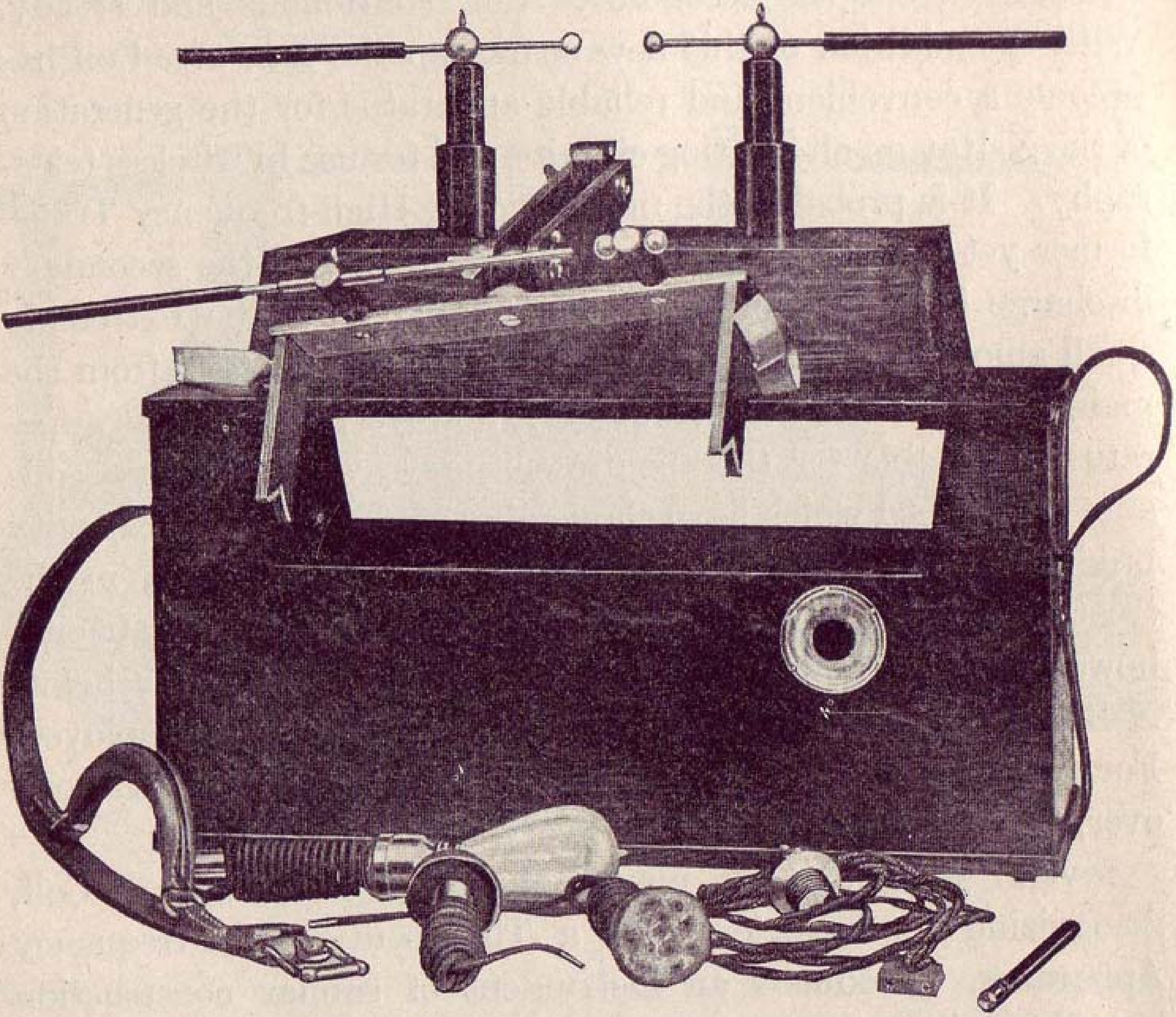
Coil	Static	Current	Interrupter	Tube	Amp. P. Coil	Ma. S. Coil	Length of Parallel Spark-Gap		Distance of Anode from Part		Months	Days	Minutes	Methods Used in Measuring Dose, i.e. Quality and Quantity of Ray	Remarks and Results
							Inch	Cm.	Inch	Cm.					
													Totals.		

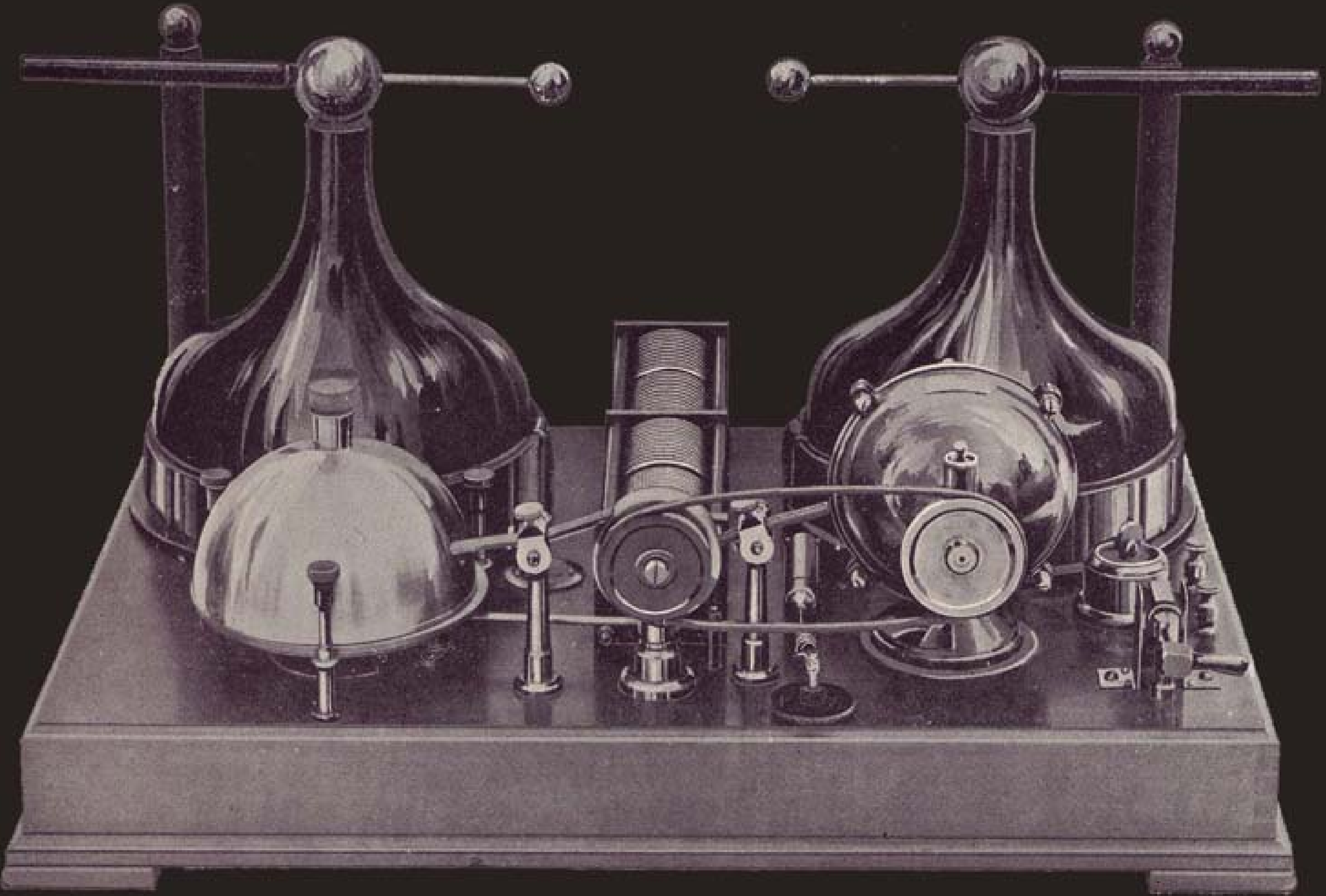
Reduced from the size of original clinical chart.

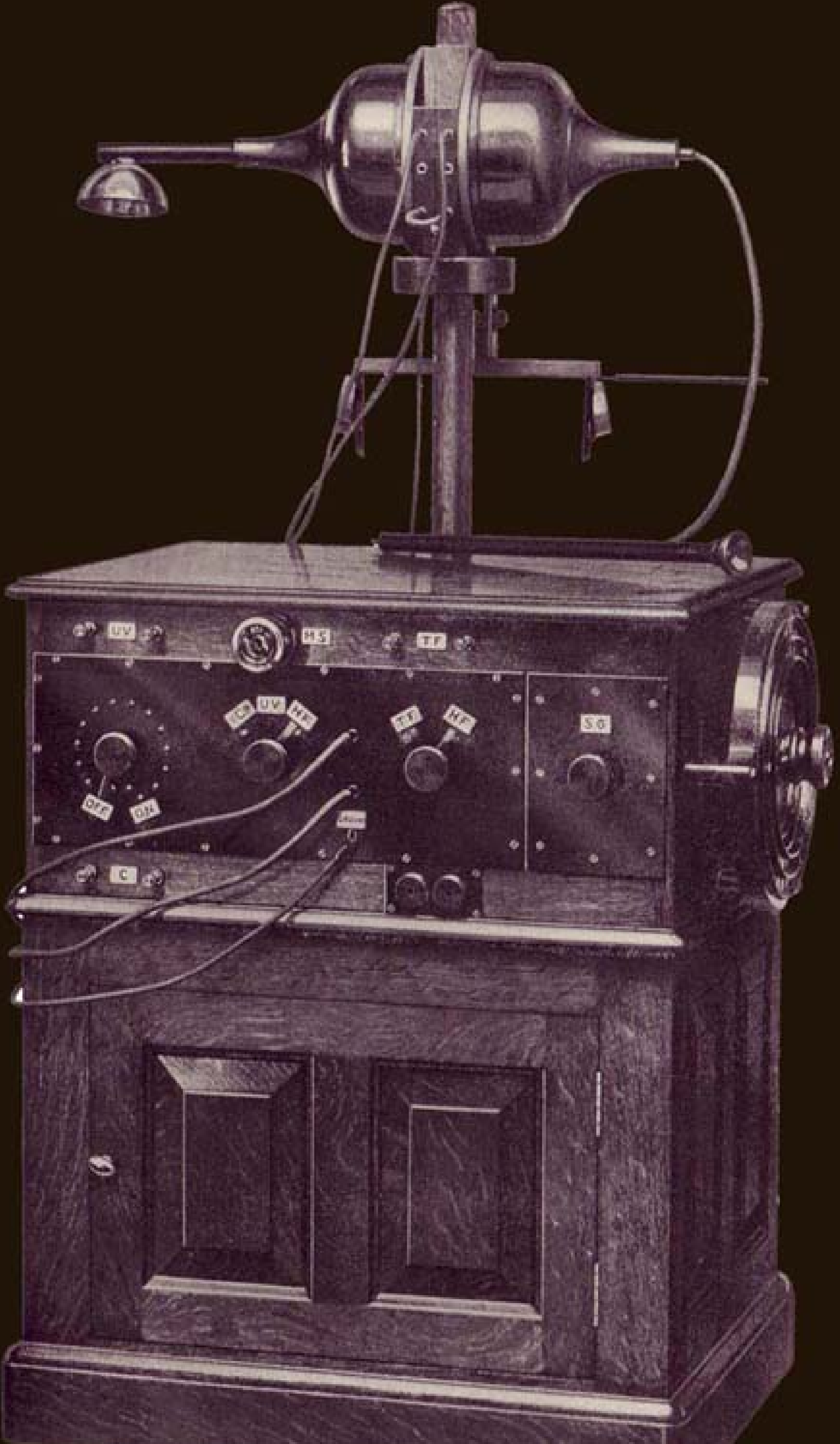



SWETT & LEWIS CO.,
BOSTON





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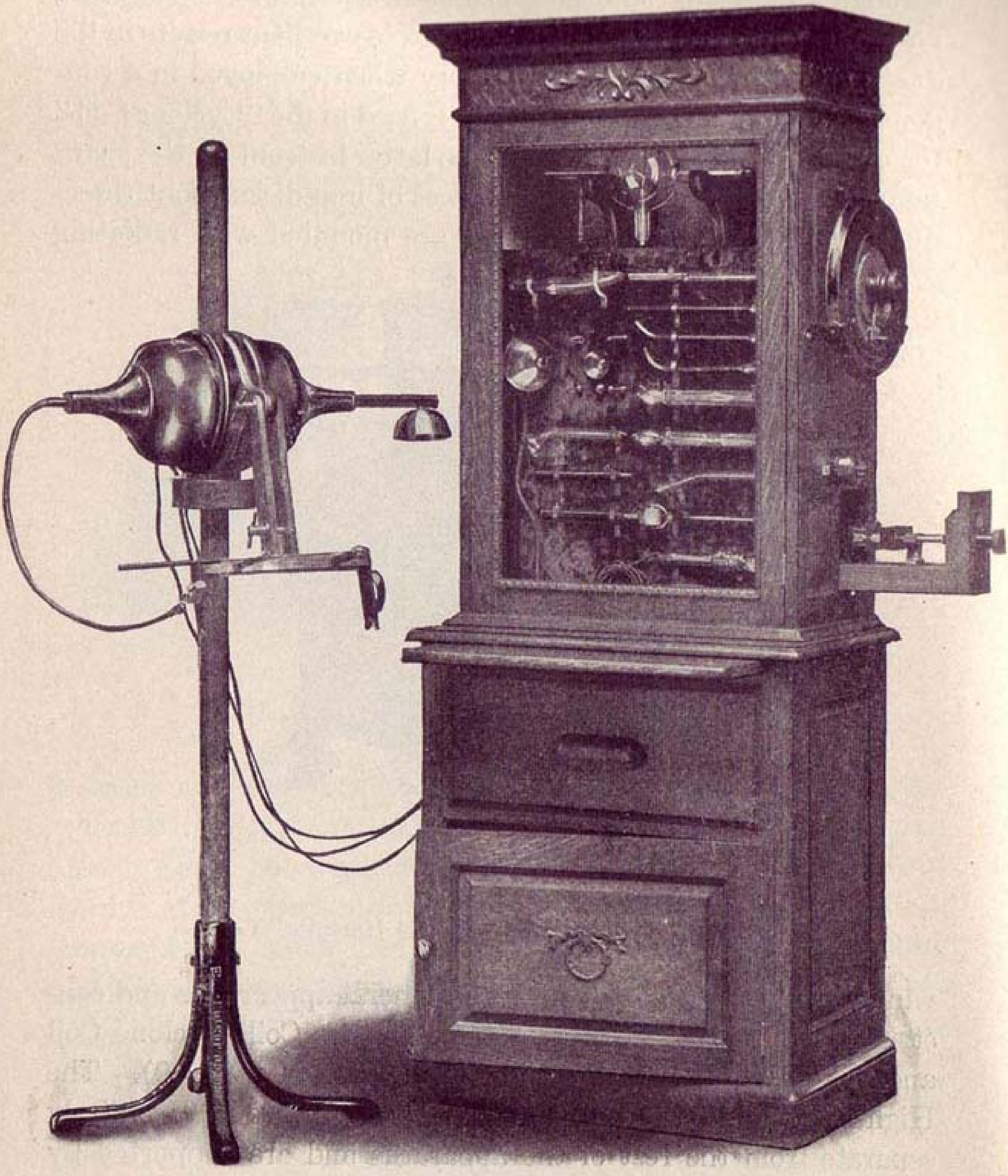

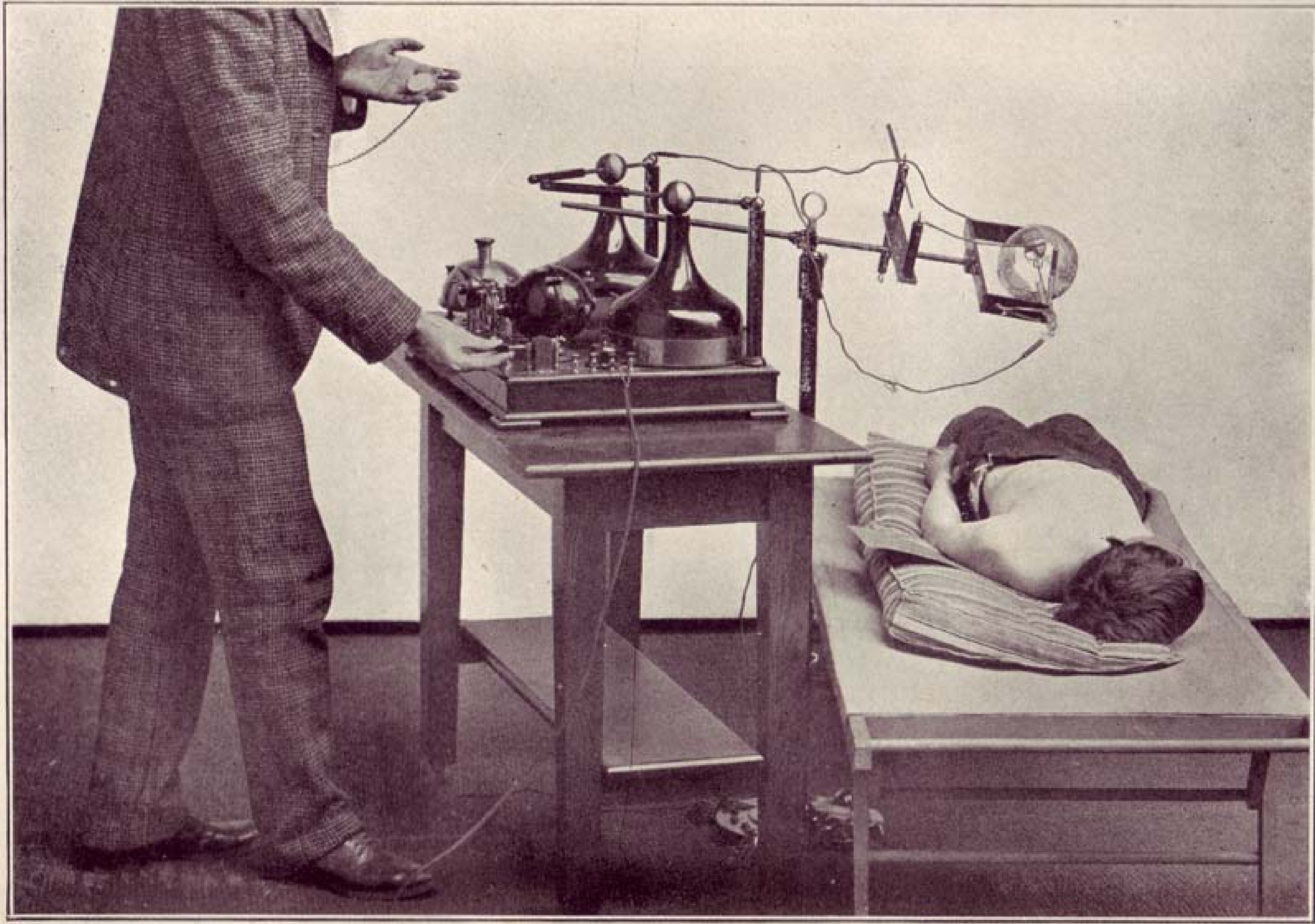

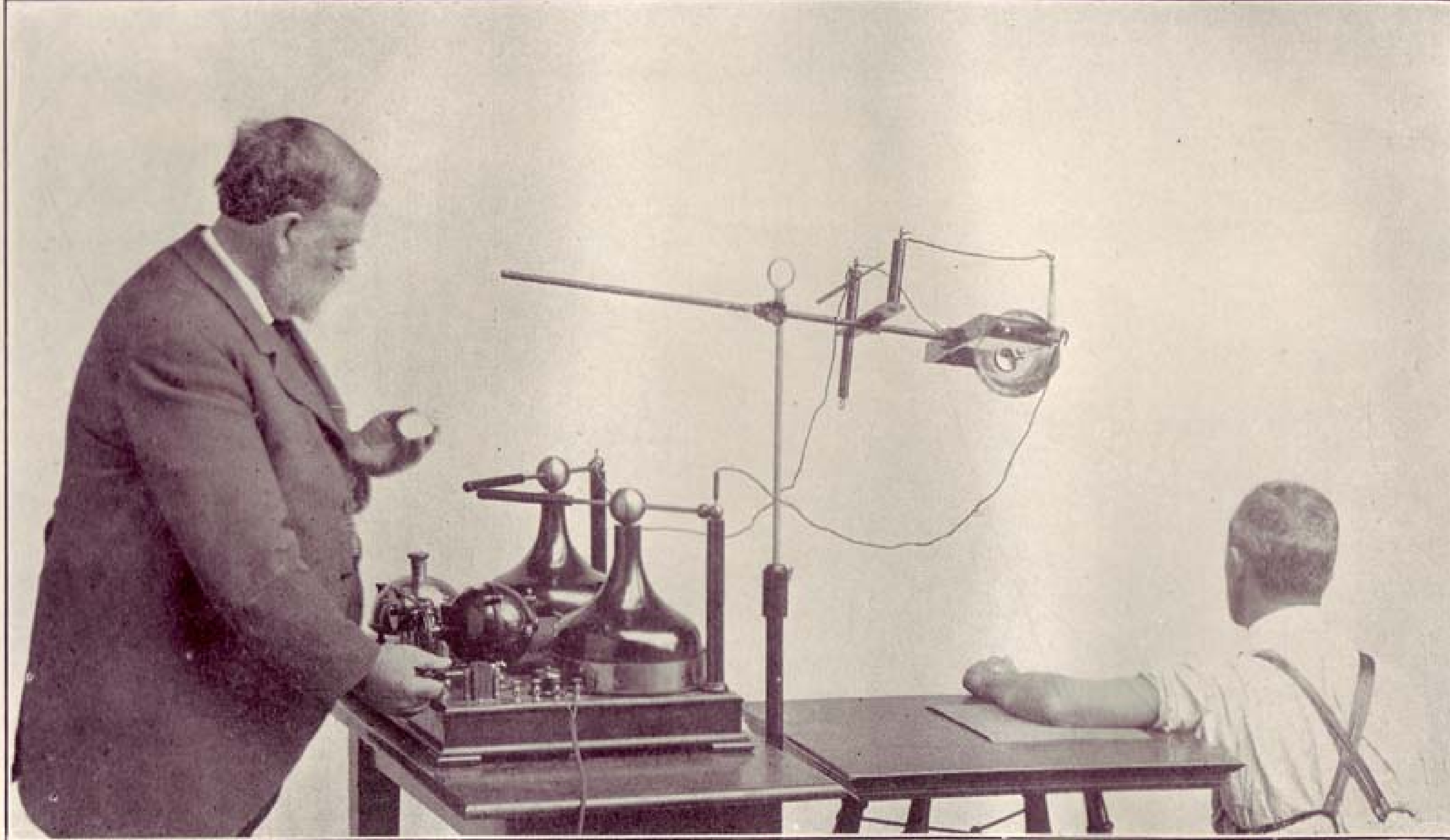

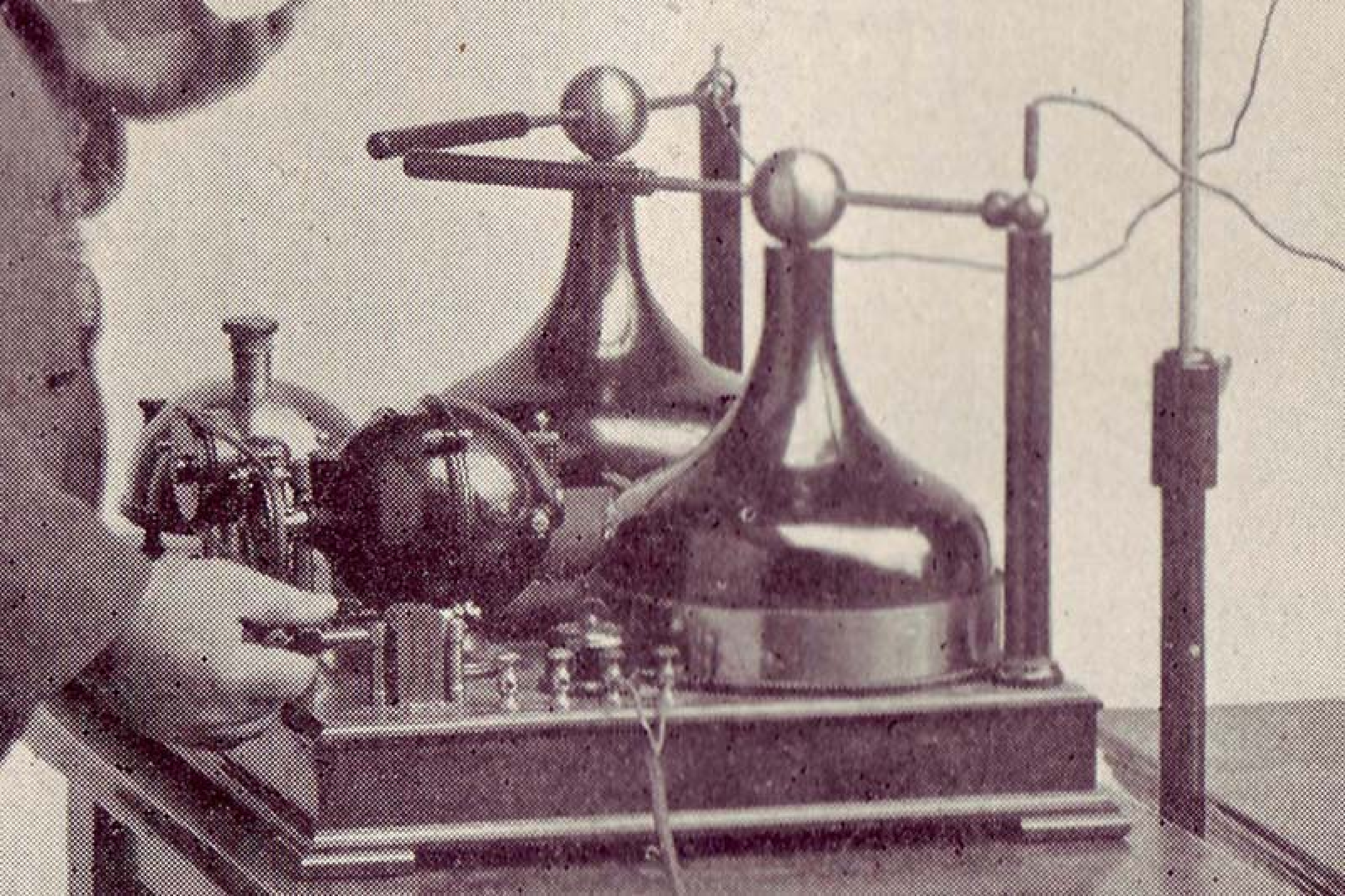

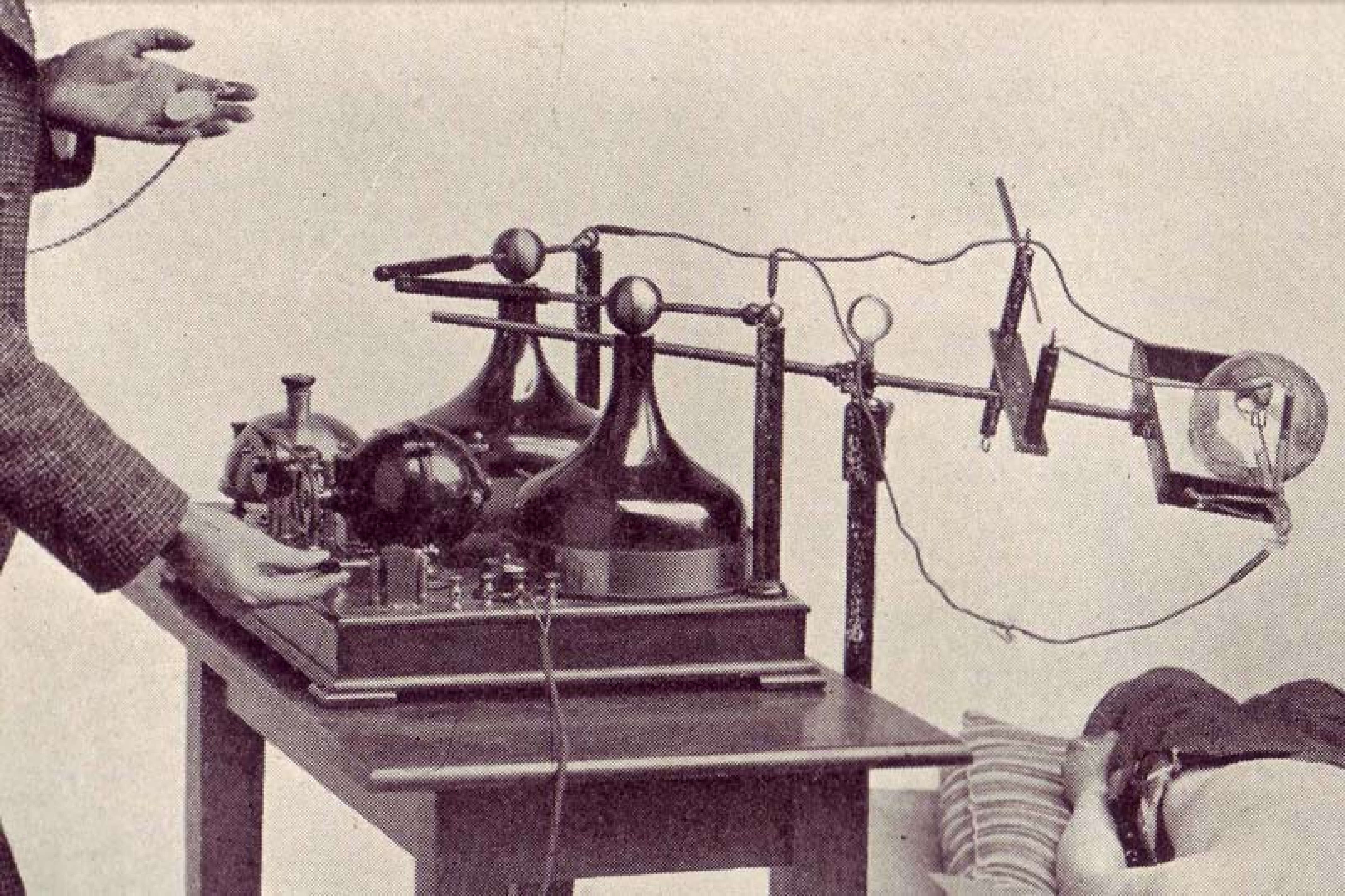

HIGH-FREQUENCY CURRENTS

BY

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Medical School, Boston.

WITH 183 ILLUSTRATIONS IN THE TEXT

NEW YORK
REBMAN COMPANY
1123 BROADWAY

A magazine article by *Tesla*, published in 1893, gave the writer his first idea of the nature and therapeutic possibilities of High-frequency Currents. *Tesla* reported his observations of the stimulating and vitalizing action of these Currents in the cases of several of his assistants, and upon his own organism. Although disclaiming any belief in the therapeutic value of the older forms of electricity then in use (Faradism, Galvanism, etc.), he professed himself as fully convinced of the important part that his High-frequency Currents of High Potential were destined to play in the Healing Art of the future. These facts were not considered at the time, as of more than passing interest, but were brought back to the writer's memory a few years later in a lecture on the X-Ray at the Massachusetts Institute of Technology, in which the methods for the generation of High-frequency Currents were explained, and demonstrated by a small coil of the *Thomson* type excited by the discharge of a battery of *Leyden* Jars charged by a *Ruhmkorff* Coil. There was at this time practically no literature on the subject, except a report of *Tesla's* lecture before the Royal Society of Electrical Engineers, in 1891.

Through the courtesy of *Dr. J. B. Sutherland*, at that time Professor of Anatomy at Boston University School of Medicine, the writer was given the use of his private laboratory for the purpose of carrying out investigations concerning *Roentgen's* newly discovered "X-Rays." His first work was done with a small three-inch spark coil, laboriously wound by hand, and a small *Crookes* tube obtained from *Queen & Co.* A few weeks' experience demonstrated the inadequacy of this apparatus for X-Ray work, and the construction of an eight-inch coil was under way when the above lecture was given at the Institute of Technology. This was the real beginning of the writer's investigations of High-frequency Currents, and his first "*Tesla* Coil" was completed simultaneously with his eight-inch *Ruhmkorff*. When primary batteries were used as a source of energy he found that the X-Rays from the latter coil were superior to those obtained from "the *Tesla*" and the latter was temporarily discarded for X-Ray work.

About this time the writer made the acquaintance of *Mr.*

T. B. Kinraide and witnessed at his laboratory in Jamaica Plain, a demonstration of X-Rays of such power as to render the bones of the trunk as clearly visible as those of the hand. Without doubt, *Mr. Kinraide* was the first investigator to produce rays of such high power, but his methods were so expensive and complicated as to greatly restrict the field of their application. A tremendous amperage was obtained from a large bank of storage cells, the current being interrupted by a heavy Platinum Break of *Mr. Kinraide's* invention. A *Ruhmkorff* coil, rated at about eight inches, was thus operated, the secondary terminals being connected with a condenser immersed in kerosene. This in turn was provided with a discharge circuit, consisting of a *Tesla-Thomson* Coil (immersed in oil), in series with a spark-gap. From the secondary of the High-frequency Coil, *Mr. Kinraide* derived the currents which he employed to excite his *Crookes* tube. Some months later he invented his well-known "*Kinraide* Coil," which superseded his original apparatus. At the suggestion of *Mr. Kinraide* the writer modified his own outfit, and adapted it for use on the 104 volt, 60 cycle, alternating, Electric Light Current, obtaining results far beyond his expectations. The only unsatisfactory feature of this apparatus was the spark-gap, which consisted of two electric light carbons mounted on an insulated support, and separated by a short air space. An air blast spark-gap, as suggested by *Prof. Elihu Thomson* increased the steadiness and efficiency of the discharge, but greatly complicated the apparatus. At this period, the *Knott* Apparatus Company, of Boston, brought out their "*Knott* High-frequency and X-Ray Apparatus," which was provided with a simple rotary spark-gap, consisting of a large metal disk, revolving in front of a brass ball. This device, we believe, was the invention of *Mr. E. Cate* of the *Knott* Company. The writer's rotary gap, employed in the "*Hercules*" Coil, is an improved and perfected form of *Mr. Cate's* device. The *Knott* Coil, which is described in an ensuing chapter, was the first American High-frequency apparatus placed on the market, and for years was the only successful coil of this kind in use for X-Ray work. With the addition of the *Knott* spark-gap, the writer's apparatus proved very satisfactory, and was subsequently employed by him almost daily in X-Ray and therapeutic work. The marked relief of pain experienced by several rheumatic patients after undergoing examinations by the X-Ray, revived in the mind of the writer the statements of *Tesla*, regarding the therapeutic value of High-frequency Currents, and led to experiments which proved that it was the *electricity*, and not the *X-Ray*, which allayed the pain, thus demonstrating the correctness of *Tesla's* theory.

From that time to the present, the writer has studied to perfect apparatus for the efficient production of *Therapeutic High-frequency Currents*, the generation of X-Rays being regarded as of secondary importance. From the first, the writer administered the treatment by connecting the patient to the terminal of his *Tesla* Coil by means of a metal hand-electrode, the opposite pole being connected with the various devices for causing the discharge to play upon the affected area of the patient's body. A few accidents, in which the electrode was carried too near the body (causing a painful spark), led to the employment of a tube of glass between the patient and the active electrode. It was but a step to substitute for the glass-covered metal electrode, a *Geissler* Vacuum Tube, in which the current passes through the body via the glass walls of the tube and the rarefied gas which it contains. This led to the invention of the *Vacuum Electrode*, a device now universally employed, but which was first devised by the writer in 1897.

In 1898 the writer devised his well-known "Air Gap Condenser Terminals," shown in Fig. 13, which illustrates the first form of the writer's High-frequency Apparatus that was introduced to the Medical Profession. By the use of these terminals, in connection with the writer's Bipolar, High-frequency, High-potential Apparatus, a number of entirely new and distinct effects were obtained. In this way, the therapeutic action of Faradic, Pulsatory and Sinusoidal Currents of Low Frequency was added to the general and local effects of the High-frequency *Tesla* Currents. Ultimately a number of distinct methods, or "Modalities," were evolved, and in 1903, at the request of a number of physicians who were using the writer's apparatus, he published his results in the form of a small treatise entitled

CHAPTER VII

THE DEVELOPMENT OF AMERICAN HIGH-FREQUENCY THERAPEUTICS

Earlier Forms of Alternating Current Apparatus

As has been stated, the first High-frequency Coils manufactured in America were of the *Tesla-Thomson* type. The "*Knott* Coil," which has been already described, was placed upon the market in 1897, and was used almost exclusively for the production of X-Rays. The "*Strong-Ovington* Apparatus," which was the American pioneer in *Therapeutic* High-frequency Coils, made its appearance in 1902, although the machine from which it was designed had been in constant use in the writer's practice since 1896. In 1901 the "*Kinraide* X-Ray Coil" was placed upon the market, and on account of its simplicity and relatively low cost met with an extensive sale. The publication of the writer's clinical results created a wave of interest in High-frequency Therapeutics, and led the manufacturers of the *Kinraide* Coil to exploit it for therapeutic purposes. (Fig. 60.) Many physicians possessing instruments of this type began to employ them in their practice in accordance with the technic described by the writer in several short articles which were published in the

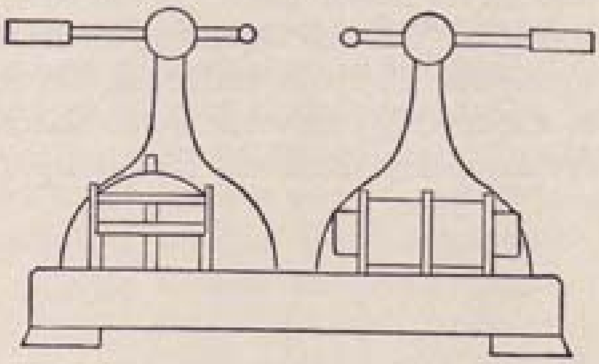

Fig. 60.—Kinraide Coil; Alternating Type.

medical journals of that period. The results were as a rule disappointing, and led in some cases to questions as to the reliability of the writer's statements regarding the therapeutic value of High-frequency Currents. In order to understand the reason for the disparity between the results obtained by the users of *Kinraide* Coils, and those produced by the writer's currents, the details of construction and the peculiarities of action of *Mr. Kinraide's* ingenious invention, may be briefly considered. His coils are of two types, designed respectively for the *Direct*, and for the *Alternating Current*. In the latter type, an Alternating Current of 104 volts—(its frequency being generally 60 cycles per second)—passes through a small closed circuit transformer which "steps it up" to a pressure of about 1,000 volts; the latter circuit is then employed to charge a condenser, consisting of a large number of sheets of tin foil separated by thin sheets of flexible or "built up" mica. This condenser discharges disruptively across a short spark-gap between heavy copper plates, in series with the primary circuits of two High-frequency Coils, the latter being the unique features of the *Kinraide* apparatus. (Fig. 61.)

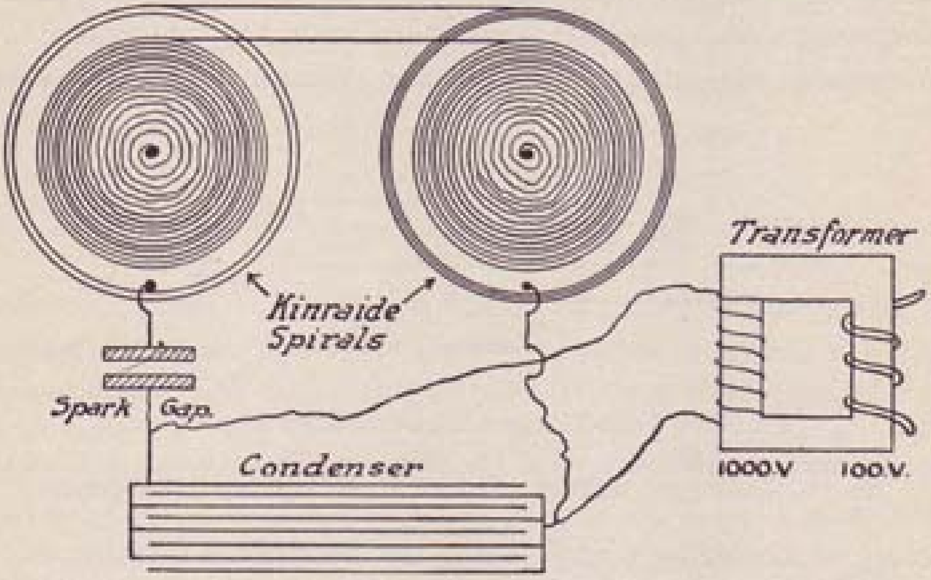

Fig. 61.—Diagram of Kinraide Coil Showing Relation of Spirals.

Each primary High-frequency Coil consists of six turns of thin copper ribbon wound one upon the other like the outer layers of a roll of tape; a strip of varnished paper serves as insulation. Each primary coil when completed forms a *ring* or *hoop*, about eight inches in diameter and one inch in width, which fits tightly over a hard-rubber cylinder containing the secondary coil, the latter being concentric with, and in the same plane as the primary coil. The secondary coil consists of a moderately fine wire wound in the form of a concentric flat spiral, and insulated with the greatest care. This ingenious construction renders a breakdown practically impossible inasmuch as the point of the highest potential is at the center of the spiral, while the outer turns are rendered practically neutral by the use of two High-frequency Coils, connected in series and wound oppositely or symmetrically, the outer ends of both the primaries and secondaries being connected by a single wire; the device is still further safeguarded by connecting the middle point of the wire which bridges the primary and secondary coils, to a single binding post attached to a *ground connection*.

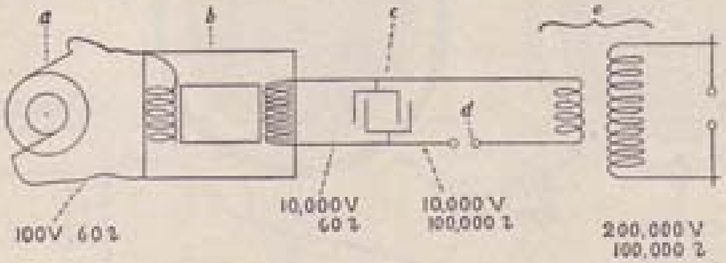

FIG. 62.—Tesla-Thomson High-frequency Apparatus.

a, Alternating Current Generator. *b*, "Step-up" Transformer. *c*, Condenser. *d*, Spark-gap. *e*, Tesla-Thomson High-frequency Transformer.

Every *Tesla-Thomson* High-frequency Apparatus theoretically consists of *three transforming devices arranged in an ascending series*. (Fig. 62.) The first is an ordinary "step-up" transformer, having a closed magnetic circuit or "core" of soft iron, differing only from the commercial transformer used on alternating incandescent light circuits, in that it *raises*, rather than *reduces*, the potential of the alternating current. It is sometimes called the "High-tension Transformer," and while increasing the *voltage*, produces no effect on the *frequency* of the current. The second essential factor in a *Tesla-Thomson* apparatus converts the *Low-frequency High-tension Current* into a *High-frequency*

Current; it is essentially a *frequency transformer*, and has no effect on the voltage, or potential of the current. It consists of a *condenser* and a discharging circuit containing a certain amount of *inductance* in series with a *spark-gap;* this *inductance* forms the *primary circuit* of the "*Tesla* Coil," in which for the second time, the *voltage* of the current is increased. This coil possesses no iron core, and raises the current to an extremely high potential; the ratio of the voltage of the *primary*, to that of the *secondary circuit*, depends on the *number of turns in the primary coil* as compared with the *number of turns in the secondary.* This law of transformation applies also to *Ruhmkorff* Coils, and to ordinary closed-circuit transformers, and may be used to calculate the approximate voltage and amperage of their different circuits: it is mathematically stated as follows:—

$$\begin{aligned} &V\,P : V\,S :: T\,P : T\,S \\ \text{and}\ &A\,P : A\,S :: T\,S : T\,P \end{aligned}$$

in which P, and S, stand respectively for the *Primary*, and *Secondary Circuits;* T for the number of turns of wire; A, for the amperage, and V, for the voltage. It is evident from the above equation that the *voltage* in the coils of a transformer varies *directly*, while the *amperage* varies *inversely*, with the number of turns of wire. The *frequency* of the current from a *Tesla* coil, is an *inverse function* of the *capacity of the condenser;* the greater the capacity, the lower the frequency, and vice-versa.

In consideration of this fact it will be evident that the frequency of the *Kinraide* coil is extremely low,—too low, in fact, to produce the characteristic physiological effects to which the High-frequency Current owes its great value as a therapeutic agent.

In the early years of the writer's investigations he made a series of comparative tests in order to determine the relative therapeutic values of High-frequency Currents of different rates of oscillation. A variety of apparatus was employed, the *lowest frequencies* being derived from the *Kinraide* Coil and the *highest*, from a small *Tesla* Coil, excited by a current from a pair of medium-sized *Leyden* Jars connected to the terminals of a ten-plate *Waite & Bartlett* Static Machine. The currents from the apparatus just described, while necessarily of extremely small amperage, were of extremely high voltage and frequency; characteristics which rendered them of especial value in the treatment of diseases of a *superficial* and *circumscribed nature*. The writer's practice at this time was confined almost exclusively to the treatment of diseases of a nervous and rheumatic character, and the "Static High-frequency Apparatus" was seldom used after the completion of the series of comparative tests above described. A year or two later a perfected form of Static High-frequency Apparatus was devised by *Dr. H. G. Piffard*, of New York City. This device which is known as the "*Piffard* Hyperstatic Transformer," has given excellent results, and is widely employed by users of the static machine. (Fig. 63.) *Piffard* has achieved remarkable results with his little apparatus, especially in dermatological work; he has recently improved and modified its construction so as to adapt it for use in connection with a *Ruhmkorff* Coil. It forms an integral part of an American High-frequency and X-Ray Apparatus which has recently been placed upon the market and which will be described in an ensuing chapter.

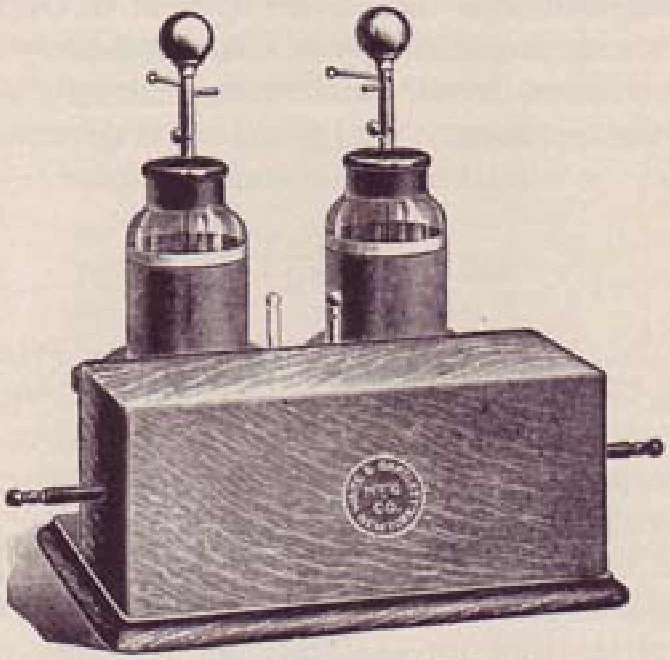

FIG. 63.—Piffard's Hyperstatic Transformer.

It is obvious that oscillating currents of different frequencies affect the functions of the body in different degrees—an assumption which is confirmed by clinical experiences—the "Hyperstatic Currents,"—which are higher than the majority of *Therapeutic High-frequency Currents*,—while valuable in the treatment of skin diseases, are less efficient in the treatment of constitutional ailments involving depleted nervous energy and poor circulation, while the currents from the writer's apparatus are especially adapted to the treatment of the latter conditions.

Diseases involving the muscles and motor nerves are most efficiently treated by currents of a *very low-frequency*—that is, *Low* from a *High-frequency standpoint;* in other words, too low to allow of their practical generation by the disruptive discharge of a condenser. A Faradic coil provided with a *ribbon rheotome* or a small *sinusoidal alternator*, giving a current of a maximum frequency of 5,000 per second being best adapted for the purpose.[1]

The *Kinraide* Coil charges its condenser with a current of *high-amperage* and relatively *low voltage*—the extremely high-potential of the High-frequency Current from this coil, resulting almost solely from the "*step-up*" transformation in the *Tesla* Coil. In most High-frequency Apparatus the increase of the potential is more or less equally divided between the "High-tension Transformer" and the "High-frequency," or *Tesla* Transformer. In *Gaiffe's* new X-Ray and High-frequency Apparatus, described in a preceding chapter, the alternating incandescent light current is raised from 104 volts to 60,000 volts, before being conducted to the condensers. *Piffard's* Hyperstatic, when used with a large *Holtz* machine charges its condenser at an even *higher voltage*.

The various machines designed and employed by the writer occupy a position between the two extremes respectively exem-

[1] No absolute rule exists for the use of the terms "High" and "Low" Frequency: "Frequency" is a purely relative term. In the present volume the writer has, for the sake of convenience, defined a *High-frequency Current* as an alternating current which does not produce muscular contractions or affect the sensory nerves; it has, in other words, a frequency of over 10,000 per second; it happens that this frequency, which marks the limit of sensation and motor re-action is the highest frequency obtainable by mechanical alternators, and we may therefore regard the term "*High-frequency Current*" as synonymous with "*Oscillatory condenser discharge.*"

A full discussion of the relation between *frequency* and *therapeutic effect* is given in the second chapter on "Physiology."

plified by the *Piffard* and *Kinraide* Coils. The capacity of the writer's condensers averages from twenty to thirty times that of *Doctor Piffard's* Hyperstatic Transformer, but it is only one-fiftieth of the capacity used in the *Kinraide* Coil. The writer's machines, therefore, generate currents of a much lower frequency than those produced by the former, but of vastly greater frequency than that of the *Kinraide* Current.

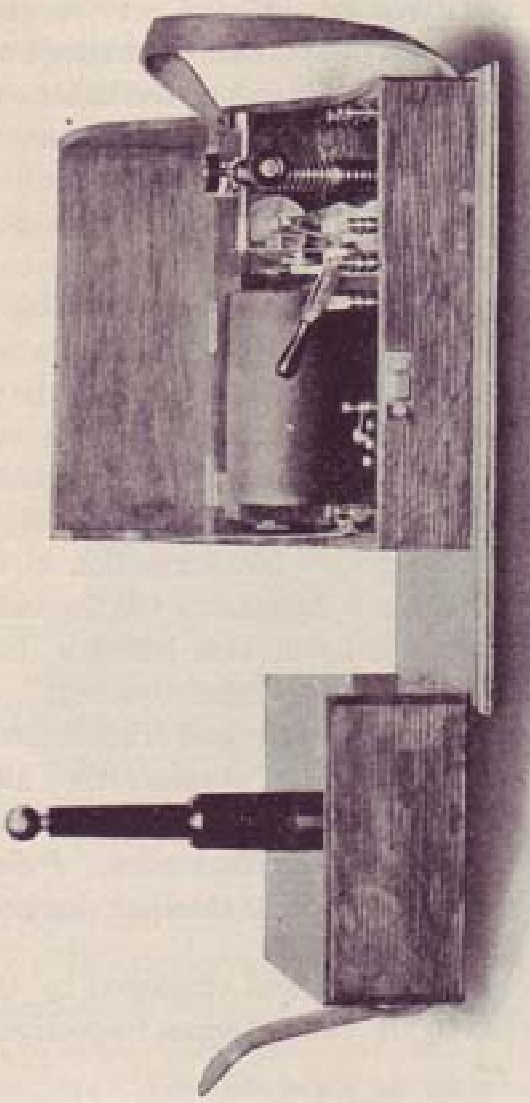

FIG. 64.—Brown High-frequency Coil.

The peculiar principle involved in the *Kinraide* Coil has been employed in the construction of two portable forms of High-frequency Apparatus, which, although of different make, are so near alike in mode of action, and detail of design, that they may be appropriately described under a single heading. A fair idea of their general appearance and arrangement of parts may be obtained from the illustrations in Figures 64 and 65. Each of these coils is designed for operation on the 104-volt alternating current, and consists essentially of a small closed-circuit transformer similar to that used in the *Kinraide* Coil, except that the ratio of transformation is somewhat greater, the secondary

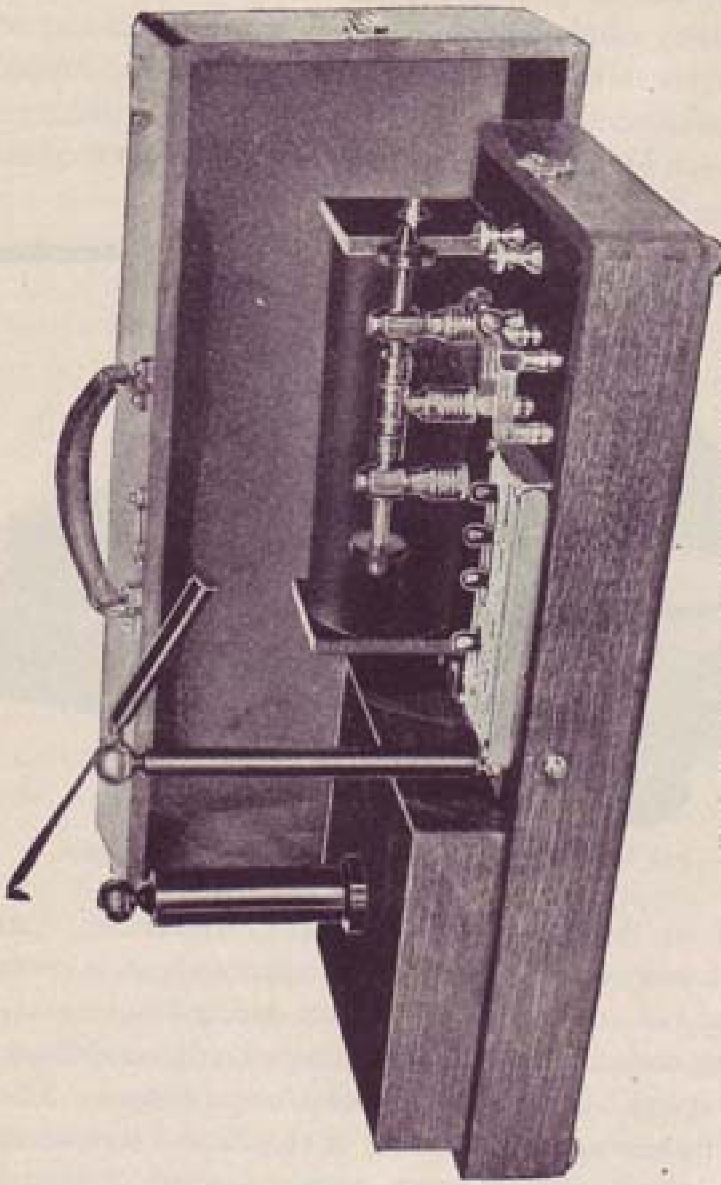

FIG. 65.—Campbell High-frequency Coil.

current having a potential of 2000 volts. The condenser is very much smaller than that of the *Kinraide* Coil, and consequently produces currents of much higher frequency. A single High-frequency Transformer is used, instead of two, as in the *Kinraide* Coil; but the principles are the same in both instruments; the secondary consists of a single flat spiral, its center, or point of highest potential, terminating in an upright rod capped with a brass ball and insulated with a hard-rubber bushing. In the coil shown in Fig. 65 the spiral secondary just described is firmly mounted on the same base with the transformer, spark-gap, and condenser, while in the second apparatus, it is arranged to fold inward at an angle of 90 degrees during transportation, the oscillating current from the condenser being conducted to the primary spiral by means of the two metal hinges. The objectionable feature of all apparatus of the *Tesla-Thomson* type has been the *spark-gap*, the corrosion and heating of its terminals seriously impairing the smoothness of the High-frequency Discharge and lowering the efficiency of the coil. In the original form of the *Kinraide* Coil this defect was of such a grave nature that many operators disposed of their apparatus at a considerable sacrifice, regarding it as totally impractical and unreliable.

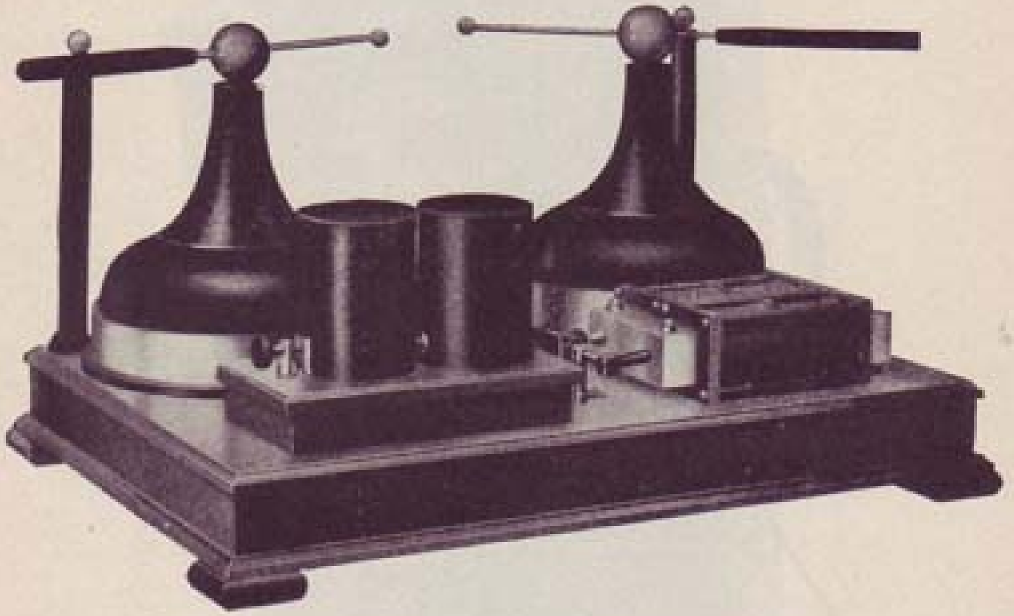

FIG. 66.—Kinraide Coil with Improved Spark-gap.

This objectionable feature has been entirely eliminated in the *Kinraide* Coil shown in Fig. 66, which is provided with an improved spark-gap consisting of two brass tubes closed by platinum caps, between the outer faces of which the discharge occurs; the brass tubes project from adjacent points in two cylindrical brass vessels filled with water, which conducts away the superfluous heat of the spark-gap and renders the High-frequency Discharge from the secondaries full, continuous and steady. With the addition of this new spark-gap the *Kinraide* Coil has become a convenient and reliable apparatus for the generation of the X-Ray on alternating circuits, and for use in wireless telegraphy. It is probably the most *efficient* High-frequency Transformer yet devised, as the power and volume of the secondary discharge is truly enormous as compared with the extremely small amount of electrical energy which the coil draws from the mains; its relatively low frequency, however, renders this apparatus unsuitable for therapeutic purposes, while the two coils above described which have condensers of much smaller capacity produce currents which may be successfully employed in the treatment of disease. This reduction in condenser capacity, however, is made at the expense of efficiency, and for heavy X-Ray work a dangerously high amperage must be employed. For the general run of X-Ray and High-frequency work, however, these coils are said to give very satisfactory results.

Several years ago the manufacturers of the *Kinraide* Coil, recognizing its inefficiency as a Therapeutic High-frequency Apparatus, introduced an instrument of similar construction but producing currents of much higher frequency, called the "*Cyclone Coil.*" (See Fig. 67.) This apparatus, which is no longer manufactured, is mentioned as an important example in the comparative study of High-frequency Coils; it uses a step-up transformer which raises the potential of the 104-volt alternating current to between five and ten thousand volts. Glass condensers are used instead of mica, and the two secondary coils (which are of the *Kinraide* type) produce a High-frequency Current sufficiently powerful for ordinary X-Ray work. Although these coils have been used with some success in therapeutic work, they do not conform with the requirements which have been formulated by the writer as essential in a High-frequency Apparatus for physicians' use. This list of requisite characteristics embodies the writer's deductions from ten years' practical experience in the construction and therapeutic use of High-frequency Coils.

In the first place, the apparatus must be convenient and attractive in external appearance and capable of transportation without fear of injury to its working parts, or loosening of the wires connecting its various circuits.

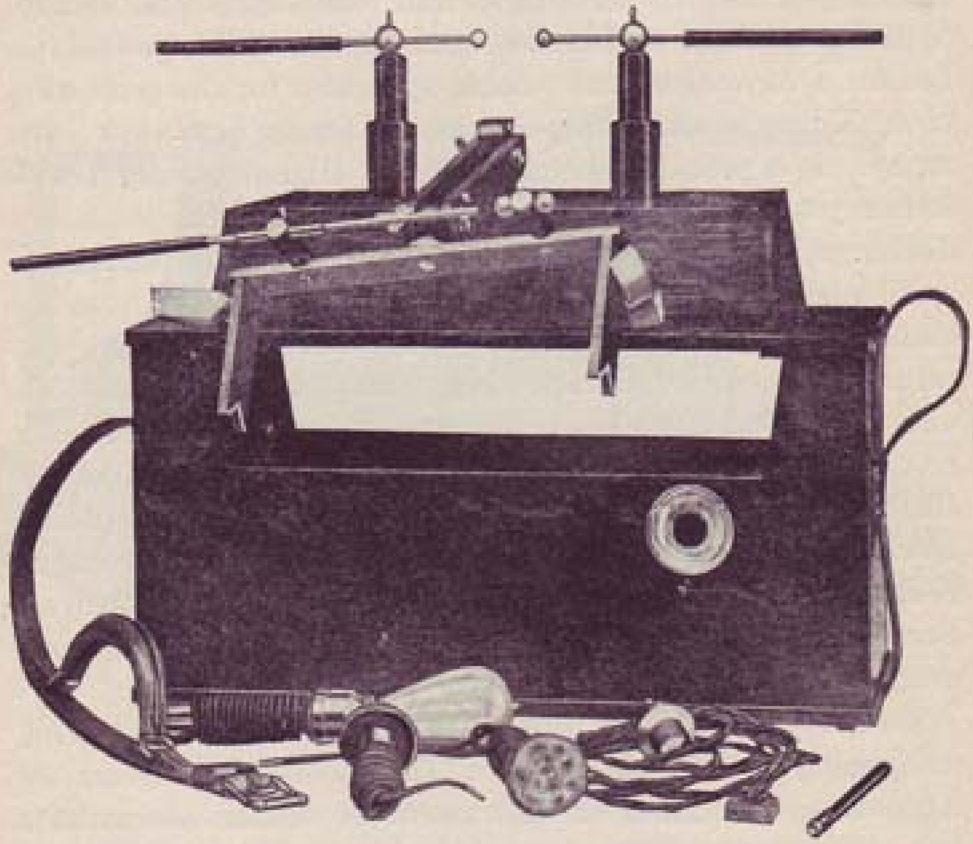

FIG. 67.—Cyclone Coil. (Portable form.)

Second, its transformers and condensers should be strongly made of the best obtainable material, and so perfectly insulated as to render the possibility of a breakdown exceedingly rare; but in the event of such an accident, the working parts should be easily and freely accessible, so as to enable the *physician himself*, in the absence of an electrical expert, *to test out his own apparatus, locate the point at which the breakdown or interruption* have been formulated by the writer as essential in a High-frequency Apparatus for physicians' use. This list of requisite characteristics embodies the writer's deductions from ten years' practical experience in the construction and therapeutic use of High-frequency Coils.

In the first place, the apparatus must be convenient and attractive in external appearance and capable of transportation without fear of injury to its working parts, or loosening of the wires connecting its various circuits.

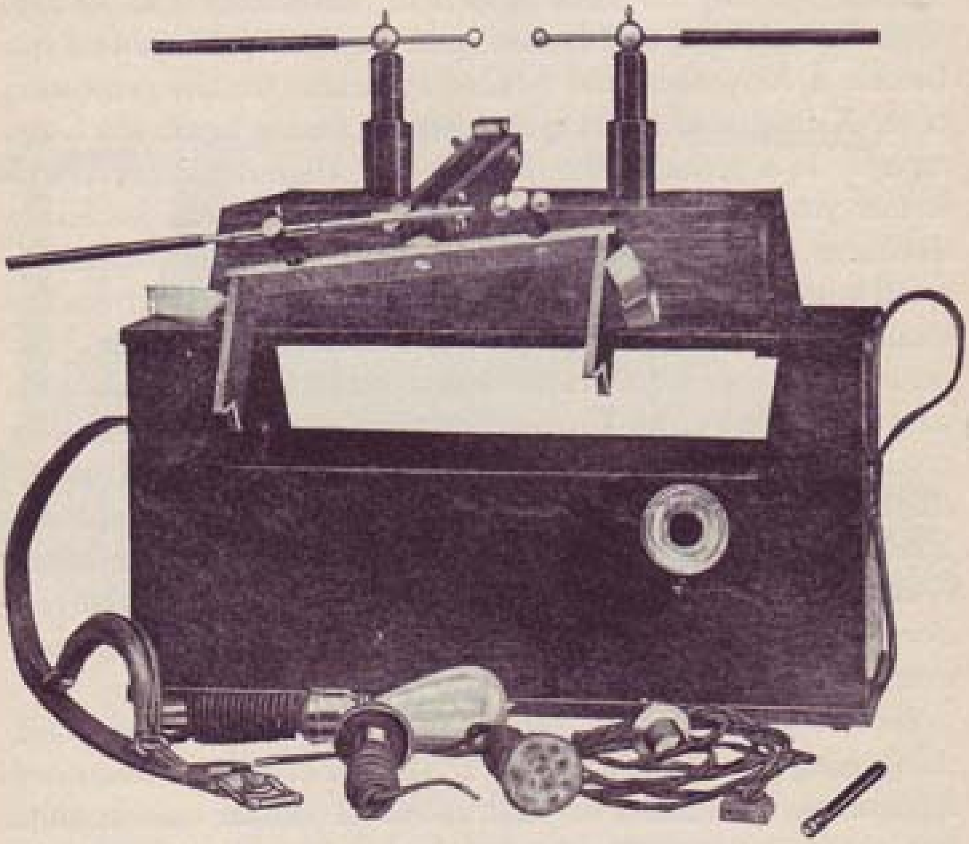

FIG. 67.—Cyclone Coil. (Portable form.)

Second, its transformers and condensers should be strongly made of the best obtainable material, and so perfectly insulated as to render the possibility of a breakdown exceedingly rare; but in the event of such an accident, the working parts should be easily and freely accessible, so as to enable the *physician himself*, in the absence of an electrical expert, *to test out his own apparatus, locate the point at which the breakdown or interruption* *of the circuit occurred, and, if necessary, remove the injured part for repairs.*

Third, the current should be under perfect control, and the output in the secondary should be capable of regulation by the following methods: (*a*) the graduation of the current used to excite the primary coil of the step-up transformer by means of a *Rheostat*, or an *adjustable inductive resistance;* ("Choke Coil"). (*b*) By a variable *spark-gap*, provided with an easily accessible micrometer adjustment. The spark-gap should be self-cooling, and if at all noisy, should be completely enclosed in an asbestos-lined compartment. Its discharging surfaces should be easily removable for cleaning, and if the action of the spark causes them to corrode and wear away they should be so constructed as to be easily and economically replaced. It should be possible to run the apparatus at its maximum output for several hours continuously without overheating, and without evidence of fluctuation or loss of efficiency. (*c*) There should be some method of varying the potential of the discharge by the introduction or withdrawal of resistance in the external circuit; this may be accomplished by the use of a variable air-gap between brass disks attached to the ends of sliding rods, by interposing glass plates, vacuum tubes, or insulated inductance coils in series with the patient in the external circuit.

Fourth, the various parts of the apparatus should be so proportioned that the High-frequency, High-potential Current from the *Tesla* Coil will possess the following characteristics· (*a*) Sufficient voltage or potential for the production of a full fine-grained "*Effluve*," at a distance of eight inches or more from the patient; the character of the discharge being such as to admit of this distance being reduced to three or four inches without danger of "arcing" the patient. In applying the *brush* discharge from the static machine, care must be taken to prevent the electrode from approaching too near to the patient's body, otherwise a *bright spark* will jump to the latter, causing a painful and unpleasant shock, with sharp muscular contractions. With *Tesla* Currents a somewhat different phenomenon occurs, the *effluve* being changed, not to a *spark*, but to an *arc discharge*, or an actual electrical flame, which often burns a small hole through the clothing and causes a painful "sear" or blister, before the electrode can be withdrawn to a safe distance. By cutting out the secondary oscillations, by the interposition of *ohmic resistance* in the condenser circuit ("*damping*" the oscillation in other words), we can obtain from a *Tesla* Coil "Brush" and "Spark" Discharges closely resembling those produced by a static machine.[1] (*b*) The currents should have a relatively high frequency with the *shortest possible intervals* between the *different sets of oscillations*, so that no sensation of shock or fluctuation will be felt when the patient is placed directly across the *Tesla* Circuit, or when the current passes through the patient's body in series with an incandescent lamp. (*c*) The current should have a relatively high amperage, capable of bringing to full brilliancy an eight candle power incandescent lamp, when the latter is connected between the hands of two persons, one of whom holds in his free hand a terminal of the *Tesla* Coil. The current from a single terminal should be capable of brilliantly illuminating a series of five or more *Geissler* Tubes when the latter form connecting links between the hands of an equal number of persons. In order to obtain the best therapeutic results, it is necessary that a current be employed which will manifest its potential, frequency, and amperage, by lighting lamps or vacuum tubes in the *above manner*, as efficiently as when the bulbs or tubes *form a direct connection* between the body and the *Tesla* terminal. There are many coils on the market which will excite a "vacuum electrode," connected to one of their poles, so strongly that the surface of the patient's body will be blistered by a few seconds of contact with the electrode; while, if the patient be connected to the same pole by a metal handle, the above vacuum electrode will be scarcely illuminated if held in the hand of the operator and brought in contact with some part of the patient's body. The currents from such machines are useful only for the treatment of local and superficial lesions. With the best machines a *Geissler* Tube held in the hand of the operator, will glow when brought within a radius of four or five feet from a patient connected to one of the terminals of the *Tesla* Coil. (*d*) The *Tesla* Currents should be of sufficient volume to produce X-Rays capable of giving a clear fluoroscopic picture of the thorax, shoulder-joint, etc., and of giving a satisfactory skiagraphic negative of the bones of the hand in one second or less, when the machine is drawing not more than 500 watts from the mains.

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[1] See "Pseudo-Static Effects," in chapter on "High-frequency Modalities."

The exact details of construction necessary for the production of an apparatus having the above ideal characteristics can be determined by experiment only, and the writer's efforts in this direction were but partially successful until about two years ago, when he was fortunate enough to discover a combination producing results of the above character. The fortuitous circumstances which led to these results, while in some degree accidental, were mainly brought about through an exhaustive comparative study of the various types of High-frequency Apparatus that had been produced up to that time, including the writer's earlier models. For a long time it seemed to be impossible to produce currents which should be equally satisfactory for therapeutic use and X-Ray purposes. The *Kinraide* Coil produced X-Rays of great power and penetration, but has been shown to be inpractical for therapeutic use: the writer's earlier apparatus, on the other hand, while seemingly ideal as a generator of *Therapeutic* High-frequency Currents was decidedly inferior to the *Kinraide* Coil for X-Ray work. The successful production of one of these requirements seemed possible only by sacrificing the second end in view: indeed, the two seemed incompatible. There is reason to believe that other investigators reached the same conclusion. For example, the "*Jackson* Coil," invented jointly by *Mr. Kinraide* and *Mr. Howard Jackson*, which was an ideal instrument for High-frequency Therapeutics was frankly avowed by its manufacturers to be unsatisfactory as a generator of X-Rays, for other than therapeutic purposes. This coil, which is no longer manufactured, embodied a number of new and unique features which are worthy of a brief description. The High-frequency Transformers are of the "*Kinraide* type," but the secondary spirals contain fewer turns of wire, and the ratio of voltage between the primary and secondary circuits is much smaller than in the *Kinraide* Coil. In the latter the high potential is obtained almost entirely through the transforming action of the High-frequency Coils, while in the *Jackson* Apparatus the voltage is raised for the most part by the "step-up" transformer in the Low-frequency Circuit: the *Jackson* Condenser has but small fraction of the capacity of that of the *Kinraide* Coil, and consequently discharges at a much higher frequency; as the charging circuit has a potential of from 30,000 to 40,000 volts, the amperage at the spark-gap is much less than in the *Kinraide* Coil; consequently much less heat is evolved and water cooling devices are unnecessary. The spark occurs between the edges of two horizontal bars of iron about two inches long, square in section, and about one-half inch in diameter; the gap between them may be varied by a micrometer screw and the jaws which support the bars are each provided with a series of thin copper

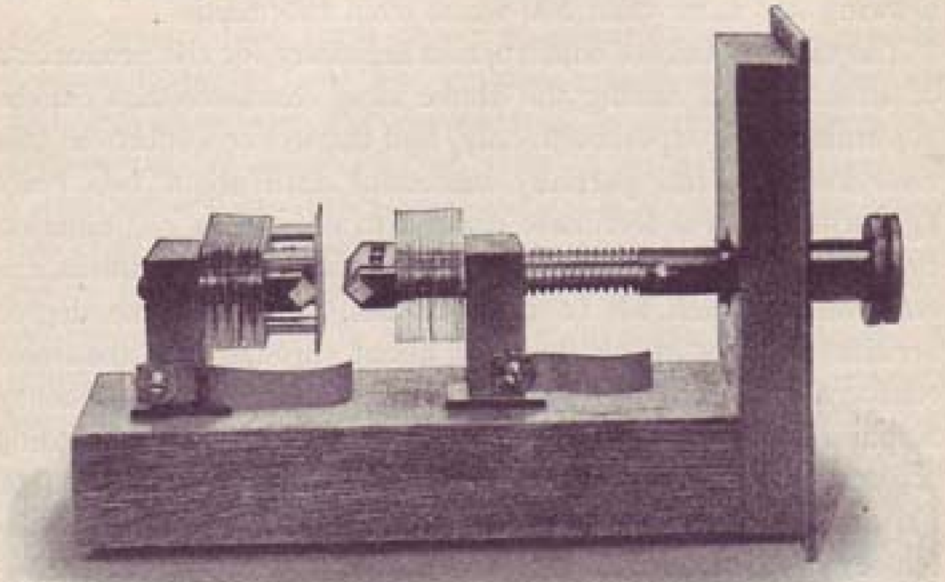


Fig. 68.—Spark-gap of Jackson Coil.

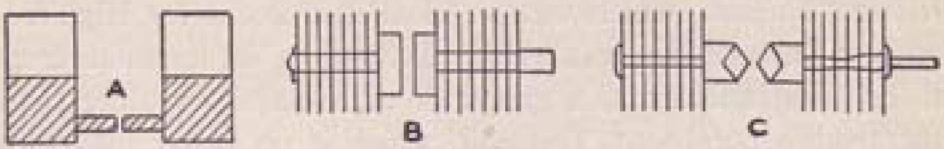


Fig. 69.—High-frequency Spark-gaps.
A, Kinraide Coil (improved). *B*, Cyclone Coil. *C*, Jackson Coil.

plates to radiate the heat; if the edges of the bars become blunted or corroded, the latter may be withdrawn, and turned through an angle of 90 degrees, so as to bring a fresh edge into position. (Fig. 68.) This spark-gap gives excellent results in the *Jackson* Coil but it is not satisfactory when employed in a condenser circuit of low voltage, such as is used in the "Cyclone Coil" for example. (See Fig. 69.) In the latter instrument the spark takes places between the parallel faces of iron disks about three-quarter inches in diameter; these are mounted with radiating wings, as in the *Jackson* Gap. The general appearance and construction of the spark-gaps of the *Kinraide* Coil, Cyclone Coil and *Jackson* Coil are shown in the illustration (Fig. 69). The High-frequency Transformers of the *Jackson* Coil are entirely separate from the rest of the apparatus and are supported by an upright wooden mast which is either fixed to the back of the cabinet, or mounted independently in an iron tripod as in Fig. 71, and the primaries of the High-frequency Coils are so arranged as to allow of one or both secondaries being used, so that the effects of a *Tesla* Coil or an *Oudin* Resonator may be obtained as desired. The greatest value of the *Jackson*

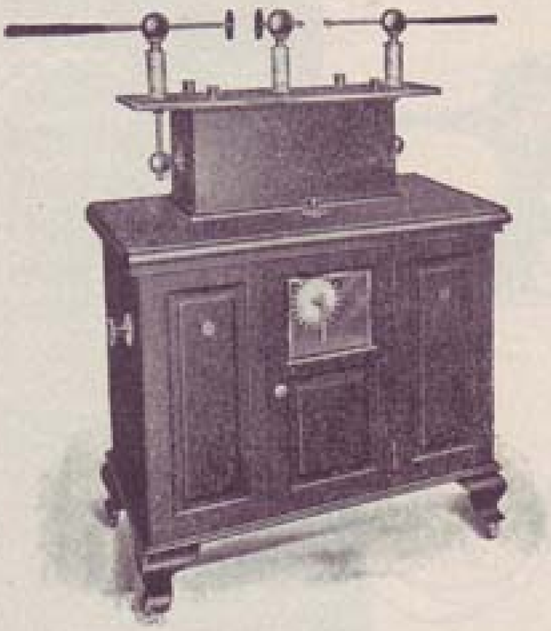


FIG. 70.—The Author's "Special Hercules" Coil.

Coil lies in its beautiful "*Effluve*," which is full, of fine grain and free from fluctuation; while it may be controlled or gradu-

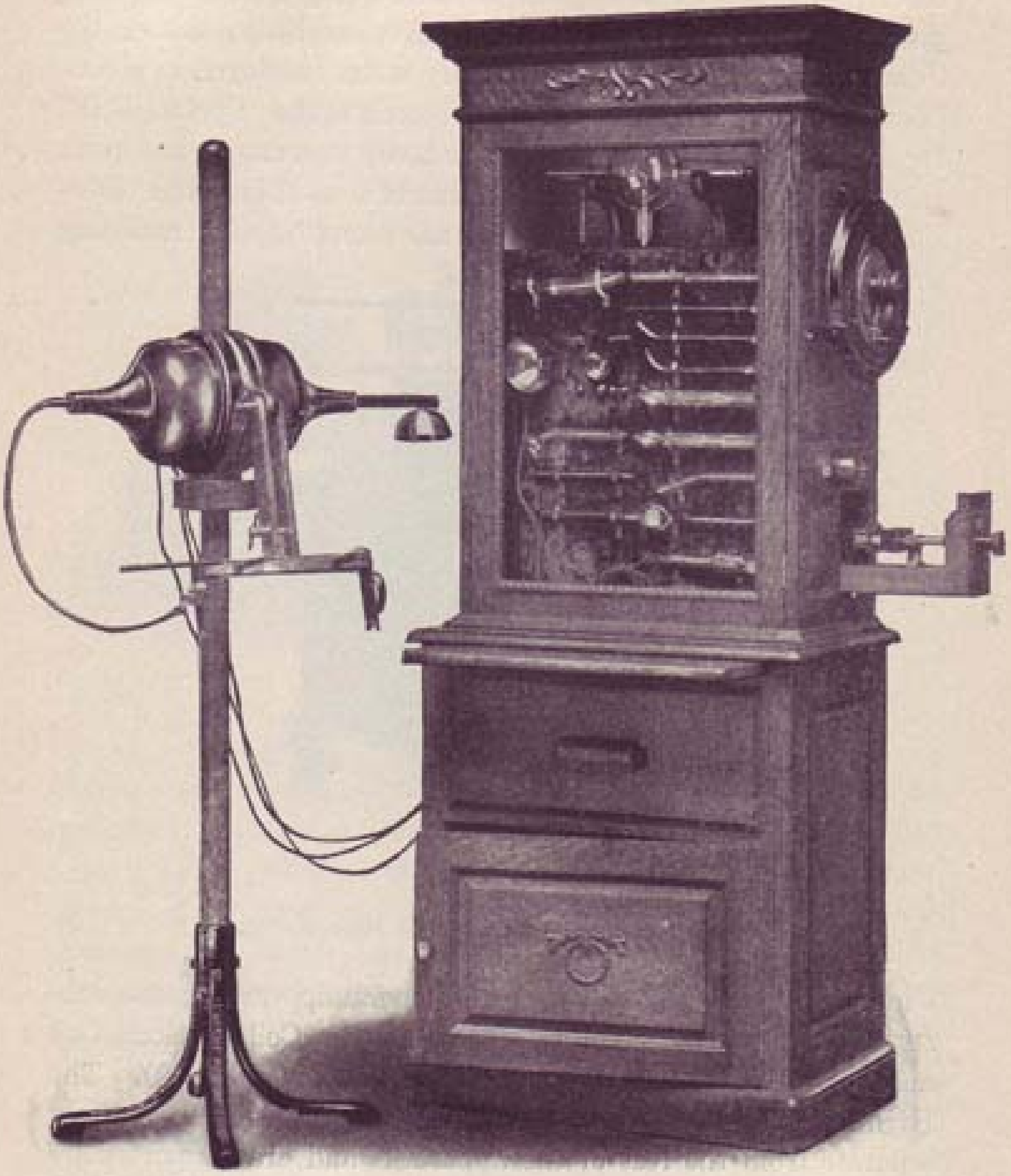


FIG. 71.—Jackson Coil with Separate Secondaries.

ated with the greatest nicety by the micrometer spark-gap, and by an adjustable *Rheostat* in the Low-frequency Circuit. Heavy "*d'Arsonval* effects" are obtained from the *Jackson* Coil by diverting the condenser discharge from the *Tesla* Circuits to a heavy spiral solenoid called the "Thermo-Faradic Coil," which will produce as high as 3,000 milliamperes of current.

In the ensuing chapter the writer will describe his latest High-frequency Coils, which conform to the list of requirements enumerated in the preceeding pages.

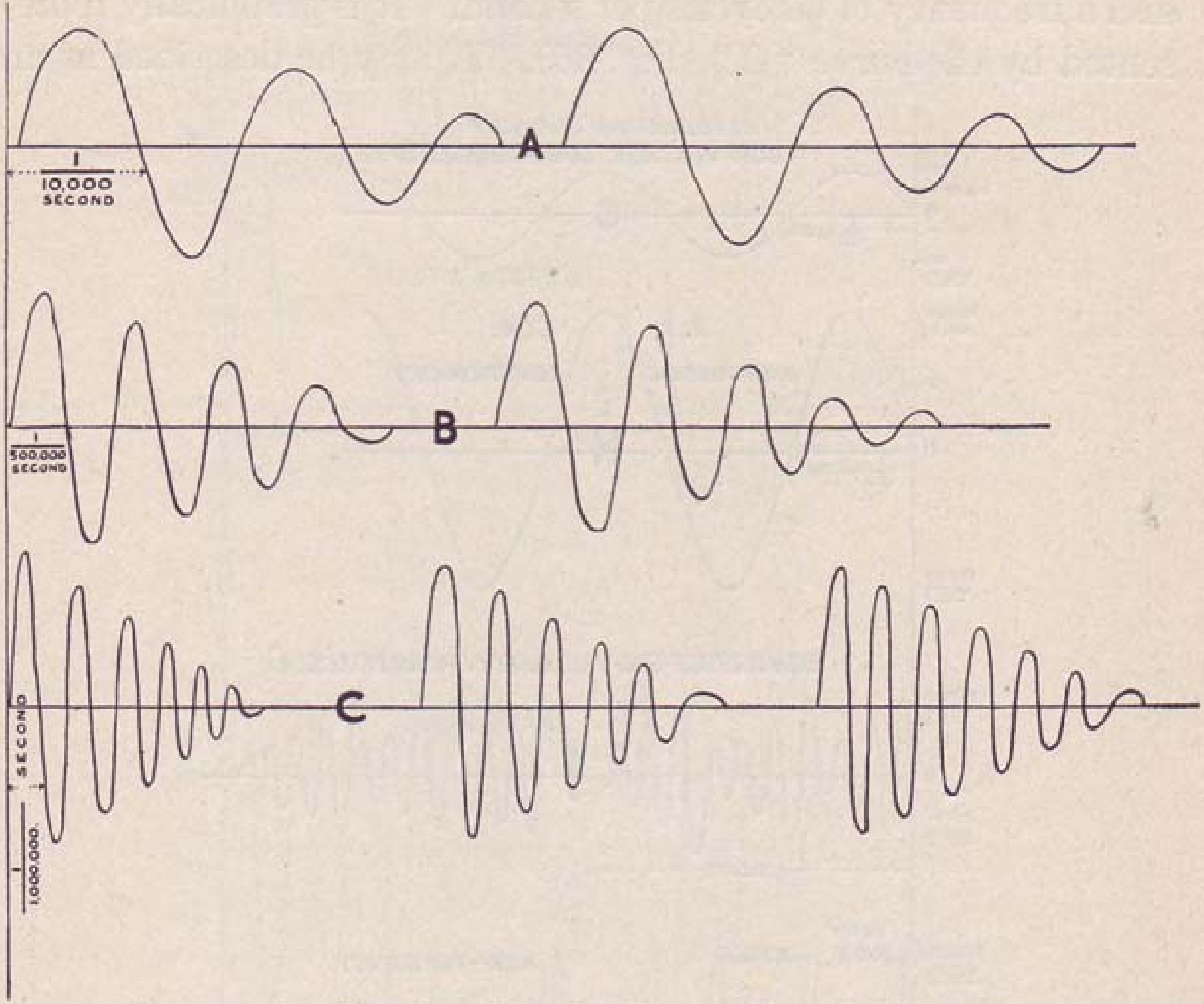
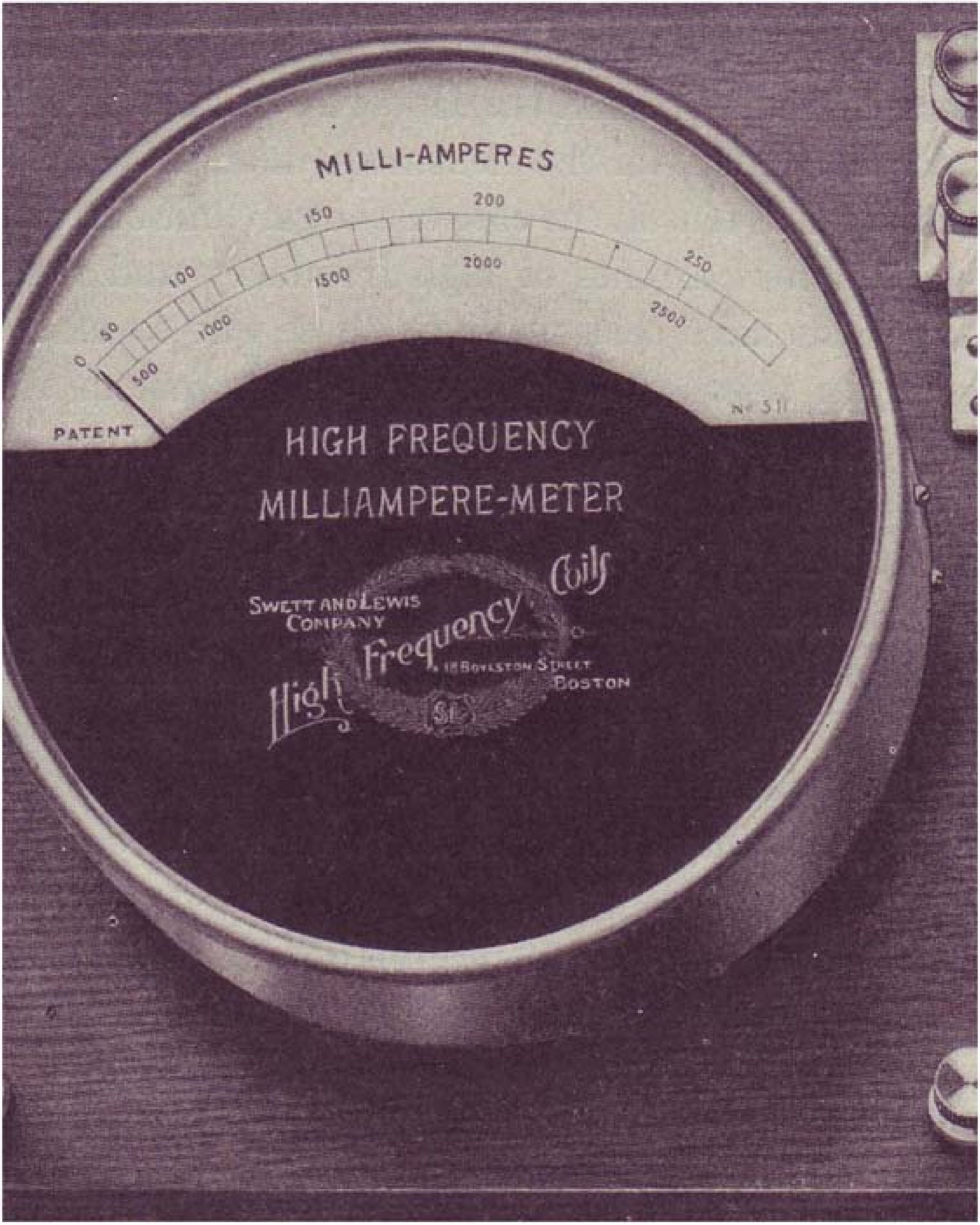


FIG. 90 (*continued*).—Tracings Showing Frequencies of Different Apparatus. *A*, Kinraide Coil Current. *B*, Ajax Coil Current. *C*, Hyperstatic Current.

"A" represents the discharge from a *Kinraide* Coil which is of the lowest frequency of any oscillatory apparatus on the market.

"B" represents the current from one of the writer's "Ajax" or "Hercules" machines, the frequency of which is very much higher than the preceding.

"C" represents the current from the *Piffard* hyperstatic transformer which has perhaps the highest frequency of any therapeutic *Tesla* apparatus.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COMPANY
High Frequency Coils
18 BOYLSTON STREET
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If the tube does not light up properly, the current is thrown off, the inductance switch changed, and the tube excited again. This adjustment is very simple, and the proper inductance for any tube for skiagraphy or for X-ray therapy is readily obtained.

(b) *Tesla Coil.*—The Tesla coil became universally known when Röntgen's discovery was first verified throughout the civilized world. The alternating currents resulting from the action of this device are of exceedingly high frequency (10 to 20 millions per second) as compared with the Ruhmkorff coil with mechanical contact breakers; whilst the induced secondary electro-motive force of the Tesla coil is hundreds of thousands of volts. Comparable to the rapidity of oscillations thus produced, is the discharge of a condenser or Leyden jar. These discharge currents are made to pass through the primary of an induction coil, devoid of the usual iron core. The primary is made up of a very few turns of thick wire; the secondary has comparatively only a few turns of wire.

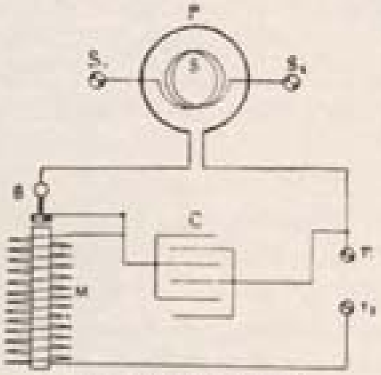

FIG. 77.—The Tesla oscillator.

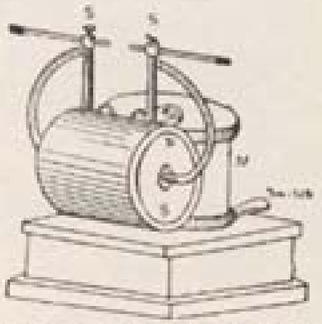

FIG. 78.—Outer view of the same.

So great is the electro-motive force that the average non-conductor would fail to effect insulation; hence the necessity of immersing the whole coil in an oil bath from which only the primary and secondary wires protrude.

For charging the condenser, it becomes necessary to pass the alternating current through a transformer, which raises its pressure to about 6000 volts. The existence of a bright, snappy spark, in the adjustable spark-gap, indicates the discharge of the condenser.

The employment of the Leyden jar is fraught with much danger, if care is not taken to make the primary circuit inaccessible. On the other hand, sparks taken from the secondary of a Tesla coil are innocuous; but the intense and continuous crackling produced by the primary spark-gap is frequently terrifying to nervous patients and children.

Tesla Oscillator. (Figs. 77, 78.)—This device consists of three parts: A vertical electro-magnet, well wound very many times with stout wire, possessing much self-induction. A condenser, which is charged by the self-induction of the electro-magnet on breaking the circuit which discharges into the primary of the horizontal transformer. The latter is composed of a single turn of copper ribbon, about six inches wide, and its secondary consists of one layer of thick wire.

The working of the oscillator is as follows: The current from the terminal, T_2, magnetizes the electro-magnet, M, which, in attracting its armature, breaks the circuit at B, and the high electro-motive force, due to the magnet's self-induction, charges the condenser C. The discharge being extremely rapid and oscillatory and flowing through the primary, P, has its voltage increased in the secondary, S. The rate of vibration should be tuned below one hundred per second. The oscillator is, for some unknown reason, not put upon the market. In the laboratory it is found to be inexpensive, compact, and very durable; the absence of any delicate wire and the general construction of the device afford almost indefinite immunity against any disturbance of its insulation; but for skiagraphic work, special tubes are demanded, because of the alternating current generated by the oscillator.

(c) *Kinraide Coil.*—The Kinraide coil, the ingenious invention of Mr. T. B. Kinraide, of Boston, is a special modification of the Tesla coil and possesses many features of merit.[1] Among other things Mr. Kinraide remarks: "The coil I have succeeded in making was the result of the repeated breaking down of the Ruhmkorff coils, ranging from six to eighteen or twenty inches. I have succeeded very well in removing from the apparatus the danger of destruction so common to the ordinary Ruhmkorff coils, etc. My object was to remove the high-potential region of the coil as far as possible from the primary. In my coil this has been done, the low potential region of the single coil being the only part it could come in contact with * * * * the moment the current is broken, the lines of force collapse and fall inward in the direction of the arrows. (Fig. 79.) In this way the highest potential is produced in the outer terminal of a thin flat spiral secondary, if located in the plane of the arrows, and the low potential at the centre. By that method of winding, as the turns grow longer, the resistance per turn increases, and the tendency of the discharge to pass from one turn to the other increases. If a suitable primary were placed on the outside of this secondary, the reverse would be the case, and hence the tendency to break down would be entirely removed in the section of the secondary. In my coil this is the arrangement adopted, and the lines of force fall away from the centre towards the primary in the direction of the arrows in Fig. 80, producing a very high potential at the centre, and practically very little or no potential at the outer turns, so that the centre discharges in the proportion of about six inches towards the earth wire whilst the outer terminal discharges about three-fourths of an inch only. To remove all tendency of discharge towards the primary, two of these coils were placed side by side (see Fig. 81). The two primaries are so arranged that a high-potential positive and negative is obtained from the centre terminals of the secondaries. There is practically no tendency whatever in this form of coil to break down."

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[1] American Electro-Therapeutic Association, held at Buffalo, New York, September 24-26, 1901.

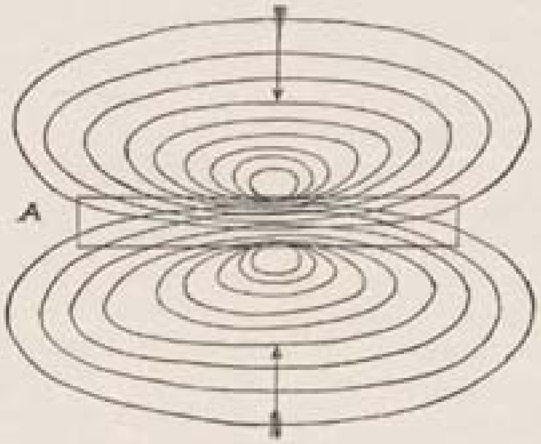

FIG. 79.—Lines of force fall in the arrows in the older form of coil.

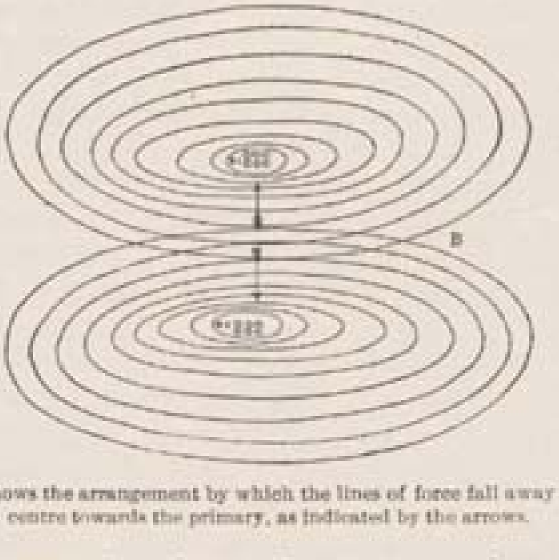

FIG. 80.—Shows the arrangement by which the lines of force fall away from the centre towards the primary, as indicated by the arrows.

In order to present in a clear and terse manner the peculiarities and advantages possessed by this recent invention, it is thought wise to append the following abridged description.

The coil consists of two separate secondaries with their primaries connected in series. Each secondary has a high- and low-potential terminal, due to the position and the method of winding the primary. The primary is located outside the secondary winding. The secondaries are wound in single flat disks and lie in the same plane as the primaries; with this method of construction the discharge from the two terminals is vastly different. The potential at the central terminal of the secondary is extremely high, while that of the outer turns near the primary is very low. By connecting the outer terminals of two such secondaries in series, the potential of the outer turns entirely disappears, hence there is no tendency to discharge into the primary.

There is absolutely no heating in the primary of the Kinraide coil, as is the case with the Ruhmkorff, so that the insulation cannot be melted, nor is there heat generated where it can in any way affect this delicate part of the apparatus.

A valuable feature is the water-cooled spark-gap. The heat ordinarily developed in various parts of other coils is localized here, where it can be cared for without trouble or risk. In other coils there is a single discharge from every interruption of the primary circuit. With this spark-gap we have a high-frequency apparatus giving many hundred discharges, or surgings, in the secondary for every break or reversal in the primary. This diminishes the time of exposure and increases the steadiness of the illumination of the screen.

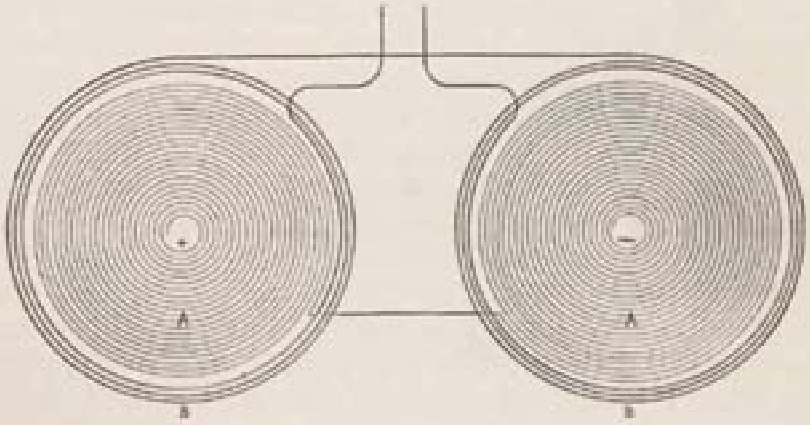

FIG. 81.—Shows the arrangement of two coils side by side: A, A, secondary; B, B, primary.

The interrupter is solid and durable, and with the spark-gap embodies an entirely new principle, running at constant speed till the motor is stopped. The alternating coil requires no interrupter, but the spark-gap is essential. The use of so little wire in the coil makes the apparatus compact, strong, and portable. The current consumed is about two hundred watts. It may be attached to any incandescent lamp socket, either direct or alternating current.

BOSTON EVENING TRANSCRIPT,
SATURDAY, MARCH 31, 1900

REMARKABLE PHOTOGRAPHS

Exhibition of Pictures of Electrical Discharges—Their Aesthetic and Scientific Interest

A remarkable set of photographs is now on exhibition in the windows of the Old Corner Bookstore. It consists of a dozen or more large pictures of electrical discharges, the most perfect that have ever been produced, and aside from their scientific interest they have an æsthetic value that is evident to every lover of the beautiful. They are the work of a Boston investigator, and save a few minor pictures by a French savant are the only photographs of the kind, save the occasional accidental sparking of a celluloid film in the winter time. The man who has induced his miniature lightning flashes to print their own images on his sensitive plates is T. B. Kinraide of Jamaica Plain. Although born in Canada, he has lived most of his life in this city. All his life he has had intense interest in electricity, and even as a child he constructed a rude frictional machine from a junk bottle. His later ingenuity has resulted in a new form of induction coil, which produces electricity of exceedingly high potential. In fact, his device is so powerful that he dare not work it beyond a certain definite intensity for fear that it will break through its superb insulation and destroy itself. Yet it is a simple and unassuming bit of apparatus. The primary coil is a flat-coiled spiral of broad copper tape, and the secondary is a single flat coil of very fine wire deeply imbedded in paraffine. The sparks produced are of such high potential that they discharge themselves into the air from his spherical terminal without the need of the usual second terminal.

The combination which produces the sparks which have made the photographs is simple enough. A dynamo, or for convenience, a storage battery, for the experiments extend oftentimes into the night after the hour when men and machinery are supposed to go to rest, a rheostat to control the current, an induction coil of his own pattern, a spark-gap and a big brass sphere for the single terminal. The apparatus is placed in a delightful subterranean laboratory, which may be made light as day by its open fire and its incandescent bulbs, or dark as midnight for the observation of the fairy fronds of the electrical ferns.

The process of photography is a simple one. The plates and developer are from ordinary formulas. A plate is placed on or near the terminal and a single spark is produced and sent upon the plate. There in the delicate tracery of its graceful growth it prints its picture by its own actinic influence and writes its autobiography on the sensitive film. In feathers or in fronds it outlines forms of rare beauty and marvellous delicacy. It even marks the perspective, and in light and shadow mimics the form of its own fleeting spark. And this is but the beginning of the story, for the production of these beautiful things has been but an incentive to Mr Kinraide, and he has been the more zealous in his research into the mysteries of nature. The story of what he has achieved is a long and an interesting one, but like the algebraic equation, it calls for technical terms to define it fully.

One popular point has been shown most graphically by Mr. Kinraide. He has noted what might actually be termed a generic difference between the positive discharge and the negative. The frost feathers, as they may properly be called, are the many times ramified discharges of the positive, while the fern-like forms are the negative, each form constant to its own genus, each one characteristic of its own to the most minute thread, and all of them marvels of beauty and decorative elements of the very highest order. The story that Mr. Kinraide can tell of the experiments which have followed his first successes in this photography is a bewildering one. It does not deal in technical terms, but in strange definitions of common ones. Used as he is to these remarkable manifestations, he talks of the ether as a homogeneous substance, and electricity, he is certain, is a polarization of the ether. He notes wide differences between positive electricity and negative, he has been able to produce the one without the other, and by an ingenious adaptation of his apparatus to photograph them each by itself. Some of his most curious pictures are along this line of experiment.

One of his curiosities is the production of ball-lightning. Now ball-lightning is one of those pleasant little yarns that sailors tell, which, like the sea-serpent, finds few believers. In fact, most of the world is ready to place it in the category of fairy tales. It comes down from the skies in a sphere of fire and bursts with a loud report. But having studied the production and conduct of electricity for so long a time, Mr. Kinraide has actually produced it and photographed it, although he has never seen the lightning in this form. Some of the photographs in the window show it. In these the negative and the positive exist together, separated by a neutral zone. Attracted by some distant positive condition, the combination moves forward, negative end first, throwing out in front of it the characteristic fronds. If the attraction continues the combination will strike it, but if the attraction ceases the combination or ball short circuits itself through the ether, and in so doing bursts and disappears.

The photographs in the window of the Old Corner store are plainly labelled. Most of them are lifesize impressions of the miniature lightning flashes, but a few are enlargements. They are shown that those interested in the work may become familiar with the results without unnecessary expenditure of time on the part of Mr. Kinraide, and give in intelligible form the more popular and tangible results of many years of patient and costly experimenting.

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close upon the heels of justice. The British have by no means a monopoly of right in this quarrel. Their African record does not entitle them to judge harshly, and, whatever the right and wrong, the only goal should be a happy, contented South Africa.

WINSTON S. CHURCHILL

HONORED BY THE FRATERNITY

Grand Master Charles T. Gallagher Complimented by His Masonic Friends

About two hundred members of the Masonic fraternity of South Boston gathered at the Hotel Brunswick last evening to honor their distinguished frater, Charles T. Gallagher, grand master of the Grand Lodge of Massachusetts. Grand Master Gallagher is a member of St. Paul's Lodge of South Boston, but al lthe Masonic bodies of the peninsular ward participated in the testimonial to pay tribute to the Masonic high standing of the guest. A reception was held in the Venetian room from six o'clock until seven, when the large company and their guests sat down in the dining-room. Past Grand Warden William H. H. Soule, who, as master of St. Paul's Lodge in 1873, conferred the degrees upon Brother Gallagher, presided, and after dinner began the speechmaking. He introduced the guest of honor,who was received with great enthusiasm. In the course of his remarks the grand master said if he had ever done a kindly act in his life it had come back to him with compound interest. He spoke of the great brotherhood, the tenets of which are friendship, morality and brotherly love, and of the lasting benefit to all men if they were incorporated in their daily lives. Past Grand Master C. C. Hutchinson was the next speaker, followed by John M. Clark, the second oldest member of St. Paul's Lodge and past master. General Charles H. Taylor was the next speaker, who referred eloquently to the grand master, than whom, he said, none has ever done more kindly acts in his life. Sereno D. Nickerson, grand secretary; Herbert F. Morse, grand commander of the Grand Commandery of Massachusetts and Rhode Island; Theodore L. Kelly; John Carr, grand treasurer; Rev. E. A. Horton, E. R. Cheney and Ira W. Goodrich also spoke. Music for the occasion was furnished by George L. Tyler, Herbert Johnson, Joseph L. White and an orchestra. The committees in charge of the affair were composed of members of St. Omer Commandery, K. T., St. Matthew Royal Arch Chapter, St. Paul's Lodge, Gate of the Temple Lodge, and Adelphic Lodge.

PERSONAL

Rev. E. W. Strecker, pastor of the Methodist church in Saugus, has accepted a call from St. Paul's M. E. Church of Indianapolis, Ind.

Among the passengers booked to sail for New York from Southampton today, on board the steamer St. Louis, is the Duke of Newcastle.

B. Otis Danforth, for the past eight years superintendent for the Cambridge Electric Light Company, relinquishes that office today, on account of ill health.

The engagement is announced of Dr. C. E. Parkhurst of Somerville, son of Rev. Dr. Charles Parkhurst, editor of Zion's Herald, to Miss Helen A. Chandler of Lawrence, daughter of Mr. H. F. Chandler.

The engagement of Paul Leicester Ford, historical writer and novelist, to Miss Grace Kidder, only daughter of Edward H. Kidder of Brooklyn, has been announced. Mr. Ford is a brother of Malcolm W. Ford, noted amateur athlete, and of Worthington C. Ford of Boston.

Secretary Long will leave Washington today to visit his invalid daughter, Miss Helen Long, at Colorado Springs. Recent reports of Miss Long's condition have been encouraging, but it is considered advisable that she should remain in Colorado for at least a year longer.

Miss Katherine Reed, daughter of former Speaker Thomas B. Reed, in an interview concerning her graduation from the woman's law class of the University of New York says: "I did not study law to practise it, but only to gain a general knowledge of the subject. I wanted something to do, and decided the study under question would furnish me the desired occupation. My interest in law increased with the days devoted to it."

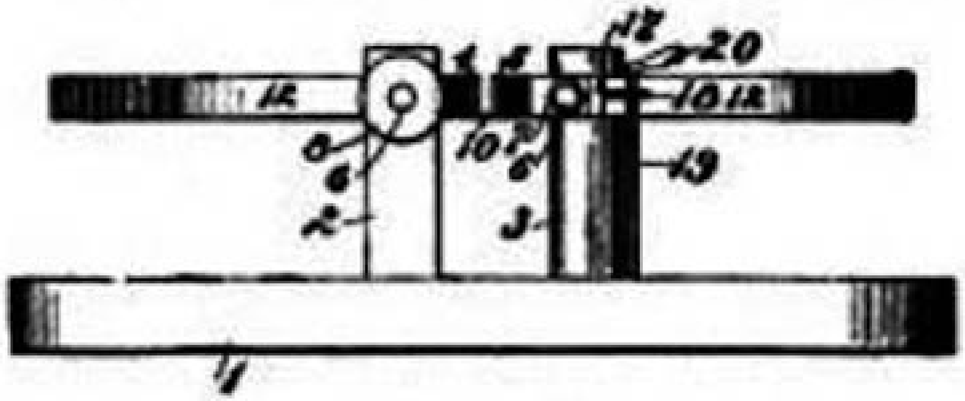
Mrs. Nancy Knight of Woburn was ninety-five years old Friday. In point of age she is the oldest person in the city. She was born in Newburyport in 1805, and is a descendant of the famous Knight family that long ago settled in that locality. Her mother died when she was twelve years old, but her father lived to be ninety-two years old. She has lived in Woburn nearly all her life, and for many years has made her home with her daughter, Mrs. Kate L. Stearns, in Sturgis street.

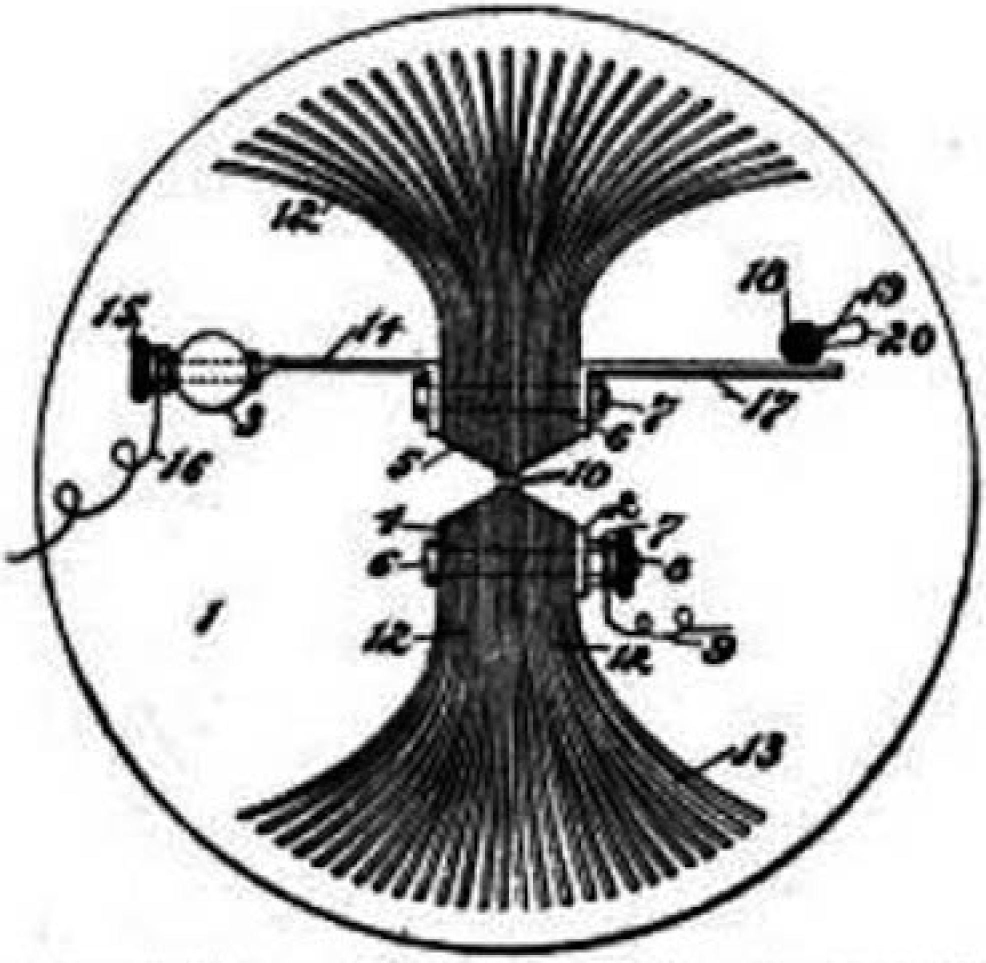
Mr. and Mrs. Willard J. Sawyer of Keene, N. H., will celebrate this evening the fiftieth anniversary of their marriage. Some four hundred invitations have been sent out. Mr. Sawyer was born in Alstead, N. H., April 14, 1824. At the age of nineteen he came to Boston, where he was employed for twenty-one years as a carpenter and millwright. He then went to Keene with his family. Mrs. Sawyer was Miss Martha A. Burrill of Chesterfield. The couple were married in Lowell street, Boston, March 31, 1850.

Marked improvement in the condition of Henry G. Nichols of the law firm of Nichols & Cobb, Water street, is reported today, giving much encouragement for his recovery from the effects of an operation which he lately underwent at his home in Beacon street. Last night proved a fairly comfortable one for him and today he is resting quietly. Mr. Nichols, it may be re-

Ultra-violet Lamp with Heat-radiating Qualities.

The quality of the light produced by the usual ultra-violet lamps (operated by a condenser discharge) is said to decrease as the lamps get heated, and the ultra-violet rays quickly cease on overheating of the lamps, so that it is practically impossible to maintain the ultra-violet ray continuously for effective work for any comparatively long period. It is desirable, if not necessary, in many instances that the production of this ray shall be not only continuous, but substantially uniform and reliable. Accordingly Thomas B. Kinraide of Jamaica Plain, Mass., has devised a particular form of lamps for accomplishing the desired result, upon which he has received a patent.





ULTRA-VIOLET LAMP WITH HEAT-RADIATING QUALITIES.

Mounted on a suitable base, as shown in the accompanying illustration, are opposite standards, supporting the opposite electrodes (4) (5), the former in fixed position and the latter in adjustable position. Each electrode is composed of a large number of thin plates clamped compactly together adjacent one end by suitable means, as by a bolt (6), which in the adjustable electrode is shown as simply provided with a tightening nut (7) and in the fixed electrode is shown as provided also with a binding nut (8) for holding in place a terminal wire (9). The central plates (10) are composed of material suitable for producing to the best advantage the desired results, such as iron or steel, and at the opposite sides are similar thin plates (12) of like material or of copper, aluminum, or any heat-dissipating substance, the plates converging as close to the discharge points of the electrodes as feasible without interfering with their proper working, and at their opposite ends extending rearwardly from the arcing point to a considerable distance and separated from each other by fan-like formation, as clearly shown at (13), forming between them air passages. This formation, under the heating influence of the electric current, causes a rapid flow of cooling air, tending to absorb and remove the heat radiated by the flaring rearwardly extending plates (12).

Western Electrician May 12, 1906

An Improved High-Frequency Coil.

To one who has investigated the various methods of exciting X-ray tubes, the early difficulties encountered in making an efficient tube seems not so surprising. The only instrument then available for excitation being the induction coil, it was then, as it is now, an extremely delicate undertaking to secure and maintain the right degree of vacuum.

Both manufacturers and manipulators of the induction coil agree that the correct exhaustion is the all-important consideration. This difficulty, being apparently insurmountable, induced the laboratory department of the L. E. Knott Apparatus Company, of Boston, to continue its investigations, in order to still further perfect the high-frequency coil. It was early shown that with this instrument the question of vacuum was not of such great importance as had been supposed, the rapidity of discharge being sufficient to produce good X-ray power with any reasonable degree of exhaustion.

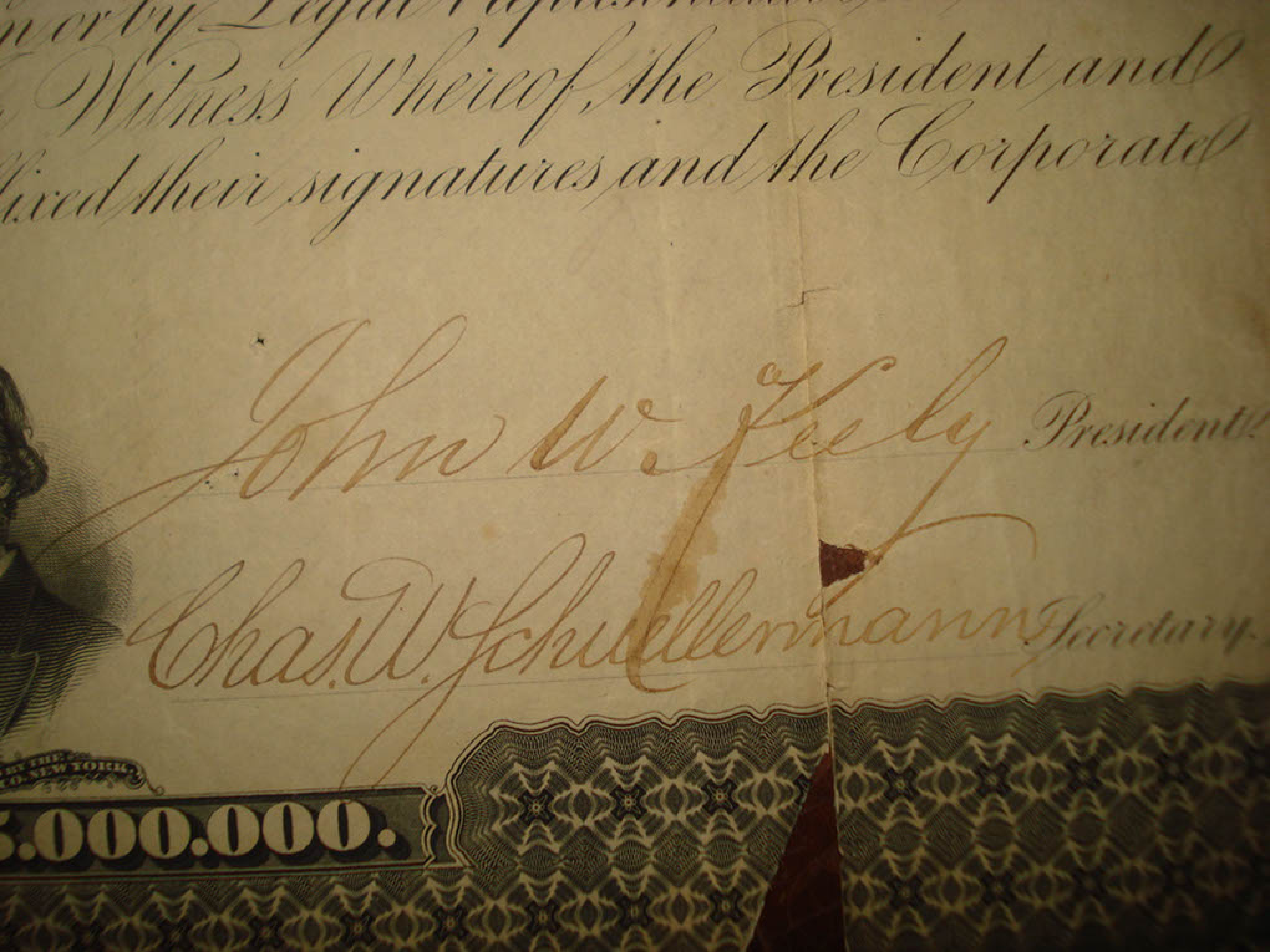
During these investigations a new and simple method of discharging the condenser with uniformity and rapidity was developed. The early coils of Hertz, Tesla and others employed numerous devices for producing this effect, some of which were quite complicated. With these devices the "tuning" or changing the capacity of the condenser to meet the varying conditions of the current was a difficult undertaking. Fortunately this new device rendered this entirely unnecessary, as it was found by the L. E. Knott Company that the rapidity and power of discharge could be easily regulated by simply closing or opening the spark gap. It is believed that it is this device which has made the high-frequency Tesla coil one of the most successful X-ray generators and a practical instrument for hospital and surgical use.

Since this coil may be operated by an alternating current, it has been supposed by some that sharp definition was not to be obtained. The results of many well known investigators, among whom are Mr. O. B. Shallenberger, of Rochester, Pa., and Dr. F. F. Strong, of Boston, prove beyond question the error of this belief. In fact, looked at from the standpoint of penetrating power, clear definition, ease and convenience of operating, the high-frequency coil commends itself to all practical workers.

A New Form of X-Ray Apparatus.

At the Spring Park Laboratory, Jamaica Plain, Mass., Mr. T. B. Kinraide has completed a somewhat radically new form of X-ray apparatus, which will permit a new method of supplying the current. The improvement principally is in the method of constructing the coil. The apparatus consists of an induction coil, in appearance like the ordinary coil, and a rotary, which may be mounted on the shaft of a hand-power dynamo supplying current for operating the coil. The plan of the apparatus is a portable outfit, such as one or two men could carry, which might be used by surgeons or hospitals or for army use. When operated by two men it is said that it will give more power than any X-ray apparatus yet made. The machine may be used with any voltage, and a feature is the perfect control of the discharge, which is of very high potential, through a tube which may be varied from the most powerful, passing through bone and flesh, or may be reduced until the flesh is merely opaque, and the vacuum in the tube being extremely high, perfect definition is obtained.

Brooklyn, N. Y., apparently holds the season's record for placing Summer cars in service in this latitude. On Sunday, March 21, both the Brooklyn Heights and the Nassau companies put open cars in commission during the middle of the day. They were splendidly patronized.



n or by Legal

Witness Whereof, the President and

ixed their signatures and the Corporate

John W. Keely President

Chas. W. Schuellenmann Secretary

5.000.000.

BY THE
NEW YORK

power of substitution in the premises.

Dated Sept 7th 1883

in presence of
W. T. Broom

x C. Shaw

x H. C. Hammond

For Value Received hereby assign and transfer unto

Shares

of the Capital Stock represented by the within Certificate and do hereby irrevocably constitute and appoint

Attorney

to transfer said stock on the Books of the within named Company with full power of substitution in the premises.

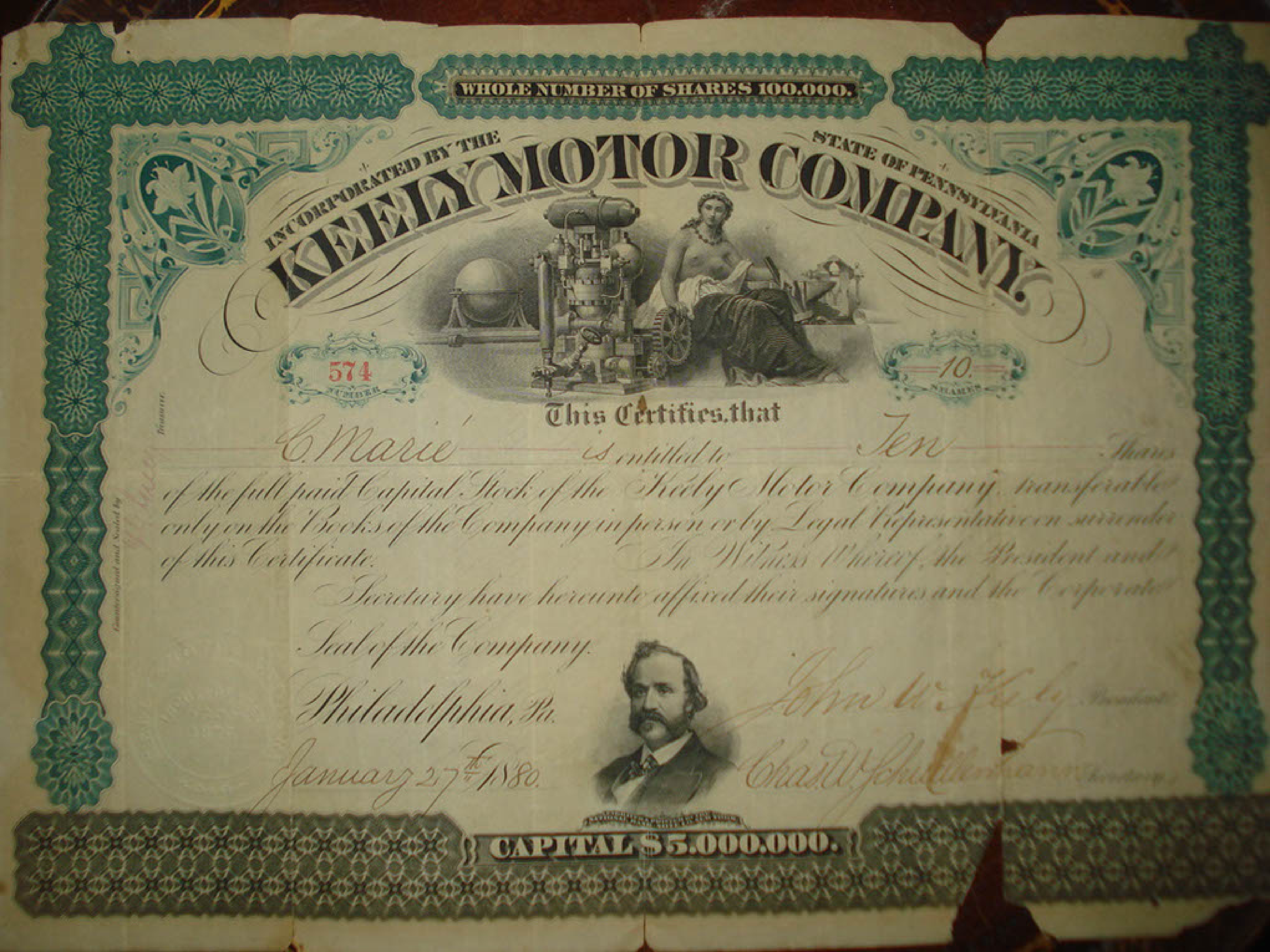
Dated Sept 7th 1883

in presence of

W. T. Brown

× C. Sha

× H. C. Hammond



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KEELY MOTOR COMPANY.

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In Witness Whereof, the President and Secretary have hereunto affixed their signatures and the Corporate Seal of the Company.

Philadelphia, Pa.

January 27th 1880.

John W. Keely President

Chas. W. Schullermann Secretary

Countersigned and Sealed by

Treasurer

CAPITAL $5.000.000.

The Cleveland Leader.

VOL. 28. CLEVELAND, MONDAY MORNING, MAY 17, 1875. NO. 116.

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AN
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Braided Linen Suits,
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Plain Overskirts and Saques,
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WE WHOLESALE AND RETAIL Paper Hangings at bottom prices. JOHN WORLEY, 2?4 Public Square.

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The New Book!
Claude Melnotte
AS A DETECTIVE.
By Allan Pinkerton, Author of "Expressman and Detective."
1 Volume, Illustrated, $1.50.
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PUBLIC MEN AND EVENTS, from the commencement of Mr. Monroe's Administration in 1817 to the close of Mr. Fillmore's Administration in 1853, by Nathan Sargent. 2 vols. ... $6 00
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Crockery,
Glassware,
Lamps,
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BELOW COST,
AT
ANTHONY BAER'S,
125 WATER-ST.

HATS AND CAPS.
ALL THE LATEST
AND MOST DESIRABLE STYLES IN
HATS and CAPS
MAY BE FOUND AT
Fuller, Jewell & Estabrook's,
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NEW ADVERTISEMENTS.

TWO CASES
4-4
MANCHESTER PERCALES
AT
One Shilling per Yard.
E. I. BALDWIN & CO.

ONE CASE
4-4
Merrimac Cambrics
IN DARK GROUNDS, AT
Fifteen Cents per Yard.
E. I. BALDWIN & CO

THREE CASES
4-4
Pacific Cambrics,
Goods that cost 21 cents by the case last season,
WE OFFER AT
Fifteen Cents per Yard.

The above will be placed on sale
Monday Morning, May 17th.

E. I. B. & CO.

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FOR
Lace Curtains
AND
LACE SHADES,
AT
Beckwith, Sterling and Co's
MAMMOTH
CARPET AND CURTAIN STORE,
No. 6 Euclid avenue.
Ladies will fail to consult their own interest who do not look at these beautiful goods.

LUPIN'S
HERNANIS!
Another line of these
Reliable Goods
JUST RECEIVED BY
SCOFIELD AND HICHBORN

BLACK GOODS.

COAL. COAL.
I am prepared to furnish
Crawford's Willow Bank, Massillon and Chippewa Coal,
By the Car Load in any quantity, or by the single Ton, delivered to any part of the city.
THOMAS PATTERSON,
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Papers!
Plain and Decorative.
The largest and most complete stock of [illegible] goods to be found in the city is at
20 Public Square.
J. DOWNIE & CO.

FISHING TACKLE.
Fishing Tackle
FOR THE MILLION,
At the Cleveland Gun Store,

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GIGANTIC SILK SWINDLE.

The Government Defrauded of Millions by a Regularly Organized System.

The Chronicle Thinks Uncle Sam Should Interfere in Cuban Affairs.

Reduction on Postage Sent to Foreign Countries.

Special to the Leader:

WASHINGTON, May 15.

THE NEW YORK CUSTOM HOUSE FRAUDS.

The exposure of frauds on the Treasury by the allowance of claims for a reduction of ten per cent. in the duty of certain classes of imported silks has led to startling revelations of other gigantic swindles by the New York Silk Ring, bringing to light a regularly organized system for the purpose of robbing the government. This, it is said by people in the Treasury Department here, is composed of many of New York's most prominent merchants, and has its ramifications extending through all the large cities of the West and South, and also Lyons, Hamburg, London, Paris and Quebec, and it is estimated that the frauds have amounted to over three millions during the past two years.

WASHINGTON, May 16.

TWO MORE DAILIES.

A new independent Democratic newspaper, to be called the Washington Tribune, is announced to start here to-morrow morning, and an evening paper of the same politics, to be called the Telegram, is booked to start next Saturday. This will make six dailies at the National Capital, three Republican and three Democratic. Besides these we have five Sunday papers, two Republican and three Democratic.

THOROUGH OVERHAULING.

The Department of Justice and Internal Revenue Bureau are to have a thorough overhauling as soon as the new Attorney General and Commissioner can ascertain where changes can be made to promote the efficiency of their respective departments.

CUBAN POLICY.

This morning's chronicle has a column editorial endorsing the proposed change of our Cuban policy already foreshadowed in these dispatches. After reciting the principal incidents of the Cuban struggle for liberty and the barbarous conduct of the Spanish Government to suppress it, the Chronicle says: "If the claims of humanity are insufficient to warrant an outside effort to stay these barbarities, the demands of commerce ought to arouse public attention. No nation on the face of the globe is commercially more closely connected with Cuba than the United States. We depend upon that island yearly for about one hundred million dollars worth of products. Besides this consideration, Cuba is entitled to our sympathy in her oppression. Her people are our immediate neighbors. They are the weaker party, struggling for liberty and their rights against an unscrupulous and relentless foe. Yet for seven years they have defied the military powers of Spain, and shown to the world, by an indomitable courage, great sacrifice and heroic endurance that they are entitled to their independence and fully qualified to govern themselves. There is a deep and general impression on the minds of thinking men, not only throughout the United States, but in Europe, that the Government of the United States should lose no time in making a determined effort to bring the Cuban sacrifice to a close.

To the Associated Press:

INAUGURATION OF PIERREPONT.

WASHINGTON, May 15.—Judge Pierrepont, new Attorney General, took charge of his office to-day and was called upon by the heads of Bureaus and others.

COMMISSIONER PRATT.

Commissioner Pratt took charge of the Internal Revenue office to-day.

CALL FOR COUPON BONDS.

The Secretary of the Treasury has just made a call for a million of coupon bonds, upon which interest will cease on and after August 15th, next. The nineteenth call for redemption of five million coupon 5-20 bonds of 1862 embraces bonds within the following numbers: Fifty dollars, No. 18,701 to No. 20,300, both inclusive; $100, No. 48,101 to 51,000, both inclusive; $500, No. 25,001 to 27,000, both inclusive; $1,000, No. 75,851 to 80,650, both inclusive. United States securities forwarded for redemption should be addressed to the Loan Division of the Secretary's office.

REDUCTION OF FOREIGN POSTAGE.

WASHINGTON, May 16.—The Postmaster General, under authority of the act of Congress of June 8th, 1872, has ordered that the rate of United States postage on letters sent to or received from foreign countries with which different rates have not been established by postal convention or other arrangement, when forwarded by vessels regularly employed in transporting the mails, be reduced from ten to five cents for each half ounce or fraction thereof, to take effect July 1st, 1875.

THE SELECT COMMITTEE

of the Senate, appointed to examine into the condition of the executive departments in order to report at the next session of Congress what reforms are necessary, have nearly completed their work.

DANGEROUSLY ILL.

Hon. Jesse D. Bright, ex-United States Senator from Indiana, is now lying dangerously ill at his residence in Baltimore with obstruction of the bowels.

AN INDIAN DELEGATION.

Major H. W. Bingham, Indian agent at Cheyenne, arrived here to-night with eight Sioux Indians and W. M. Fielder as interpreter.

COMPLIMENTARY TO [illegible]

At an informal meeting of the officers, clerks and other employes of the Bureau of Internal Revenue this afternoon, [illegible] night, at the close of his service, enjoy the [illegible] appreciation and good feeling.

THE WHISKY FRAUDS INVESTIGATION.

WASHINGTON, May 15.—The further prosecution of whisky frauds, together with all the evidence and records, will on Monday be turned over by the Solicitor of the Treasury to Mr. Pratt, Commissioner of Internal Revenue. The various supervisors who have been acting with the Solicitor have been ordered to report directly to the Commissioner, and receive further instructions from him. The secret service force of the Treasury, however, will continue to aid the internal revenue authorities in detecting and seizing "crooked" whisky and bringing the offenders to justice.

FOREIGN.

Chambord Yet Hopeful of a Monarchy in France.

An Italian Paper Incurs Suspension for Printing the Papal Address.

Election Trials in Canada—Thirty or Forty Members Unseated.

Russia Annoyed at England's Stubbornness.

SPAIN.

SANTANDER, May 16.—The Carlists have stopped firing on Guetaria, and are preparing to attack Penteria.

ITALY.

ROME, May 16.—The Journal La Voce Della Verita has been suspended for publishing the Pope's address to German pilgrims.

AUSTRIA.

VIENNA, May 15.—The Emperor Francis Joseph, who has been making a tour of his dominion, returned to-day and was enthusiastically received by the populace.

CANADA.

TORONTO, May 15.—Out of thirty or forty election trials that have taken place throughout Ontario, nearly all the sitting members of both political parties have been unseated. About twenty-five or thirty trials are yet to take place.

GERMANY.

BERLIN, May 15.—The trial of Count Von Arnim on appeal has been fixed for July 1.

BERLIN, May 16.—The priests imprisoned in Posen and neighboring towns have been released and informed that evidence with regard to the alleged secret administration of the diocese by Papal delegates is no longer required by the government.

LONDON, May 17.—A dispatch from Berlin to the Standard states that the alleged principal in the late conspiracy against Prince Bismarck's life is named Dunin and has been arrested in Cracow.

GREAT BRITAIN.

LONDON, May 15.—The Pall Mall Gazette says Russia is annoyed at England's persistent refusal to participate in the St. Petersburg conference and the coldness of other countries. She intends giving the force of law to the declaration of the Brussels conference, and is negotiating separately with the powers to induce their adherence thereto.

FRANCE.

PARIS, May 14.—The National Assembly rejected the principal clause of the Savings Bank bill, and it was thereupon withdrawn by the committee having it in charge. The Chamber adjourned until Tuesday.

PARIS, May 16.—Compte de Chambord has written a letter to M. De Belcastel, member of the Assembly for Haute Garonne, in which he declares he still has hopes that a monarchy will be re-established in France.

SOUTH AMERICA.

RIO JANEIRO, May 15.—The National Bank, which suspended, has asked the forbearance of creditors, promising to pay in full with interest. The suspension caused a sensation, and many depositors in other banks withdrew their funds. The Bank of Brazil came to the aid of the banks, and the Government introduced a bill in the Chamber of Deputies authorizing the issue of 25,000 contos to relieve the crisis, which was caused by the absorption of capital by the great undertakings in the provinces. These steps restored confidence.

CRIME.

A THIEVING BANK CLERK.

LYNCHBURG, VA., May 15.—Arthur E. Galt, aged nineteen, clerk in the Lynchburg National Bank, has absconded with $10,000.

ARREST OF AN ALLEGED PERJURER.

ALBANY, May 15.—George T. Smith of Minnesota, of middlings purifying notoriety, was brought before the United States Commissioner to-day by the United States Marshal from St. Louis, and held to bail by the Commissioner to answer the charge of perjury in getting his patent.

SENTENCED—A NEW TRIAL.

CINCINNATI, May 16.—The jury in the case of Colonel W. G. Terrell, who killed Harvey Myers, a prominent lawyer of Covington, Kentucky, about a year ago, last night brought in a verdict of voluntary manslaughter and sentenced the prisoner to the penitentiary for seven years. A motion was immediately made and argued for a new trial and the Judge granted the motion.

EMBEZZLEMENT.

A Gazette special says: Jacob Hade, formerly cashier of the Farmers' National Bank at Mansfield, Ohio, has been arrested, charged with embezzling $25,000 from that bank.

MURDER.

ST. LOUIS, May 16.—A party of unknown men rode up to the house of Ben Jones, a colored man living on the farm of John Carlon, five miles from Lexington, Mo., about eight o'clock on Friday night, called him out and riddled him with buckshot, killing him instantly. No cause is known for the act. Jones had the reputation of being a quiet, peaceable man.

[illegible]

ST. LOUIS, May 16.—A report has reached here that a fight occurred at the farm of Mrs. Samuels, the mother of the notorious James boys, near Kearney, Mo., Friday night, but [illegible] of what the [illegible] is not known.

RAILWAY NEWS.

[illegible]

GENERAL NEWS.

After the Long Trial, Tilton and His Friend will Press to an Issue the Criminal Indictments.

Bowen Tells About the Written "Submission."

Desperate Resistance of the Haytien Conspirators.

Tom Allen and George Rooke Getting Ready for a Fight.

Death of Charles S. Glenn, Editor of the Columbus Gazette.

SCANDAL NOTES.

JUDGE NEILSON AT WORK UPON HIS CHARGE.

NEW YORK, May 15.—Judge Neilson is outlining his charge to the jury in the Tilton-Beecher scandal case. His Honor's ideas of what the Judge's charge should be are somewhat different from the practice which has obtained with some of the judges in the State. Judge Neilson is opposed, as a general rule, to any comments by the Judge upon the testimony as presented. He believes in confining his charge to an outline of the case as presented, points of law involved, and points in the evidence that are entitled to particular consideration. The charge will probably occupy from a day to a day and a half.

It is stated that after the verdict is rendered, whatever it may be, the counsel for Tilton and Moulton will press the criminal indictments found against them by the grand jury last fall to some sort of an issue.

HENRY C. BOWEN SPEAKS AGAIN.

The Brooklyn Eagle has an interview with Henry C. Bowen, in which occurs the following:

Reporter—I would like to ask you one question with regard to the paper called the "Submission," which was drawn on the night of the arbitration. How do you explain the fact that on the cross-examinations of all the members the plaintiff's counsel did not ask them if they had seen such a paper?

Mr. Bowen—Because they did not know of its existence. On the night of the arbitration a friend came to me (I'll tell you who it was—it was Storrs) and said to me, "Bowen, they are laying a trap for you down there." I said, "In what way?" He answered, "Why, they are going to bring in Tilton's charge of seduction against Mr. Beecher and all other difficulties between them, and are to make them part of your settlement. They want to have them settled at the same time." I answered that they would not draw me into a trap, if I had my senses about me. So I went there and the submission was drawn up which stipulated that the business difficulties between Tilton and myself were only to be considered. It was laid on the table, and after the arbitration was over I put it with the two canceled contracts into my pocket and locked them up in my safe, and forgot it, Moulton forgot it, and their council didn't know anything about it. Tilton's lawyers came to me seven or eight times to try and get me to make some statement of what I would testify to, but I said I would not say one word until I was under oath and on the witness stand. Then when I got there Fullerton stood up, and trembling, put me the question to produce all papers in my possession relating to the case, and I did so, and when they saw the submission, Tilton, Moulton, and Tilton's lawyers were delighted, while Beecher's side was thunderstruck. Now I haven't spoken one word to Tilton since that arbitration, and the members of the committee testify that they don't remember of such a paper. Well, there is the writing of it in Moulton's big, scrawling style, with Tilton's signature and mine, three good substantial and living witnesses to the truth of my statement. What more is wanted?

PUGILISM.

A PRIZE FIGHT ON THE TAPIS.

ST. LOUIS, May 16.—Tom Allen, the pugilist, left here to-night for Pittsburgh, within fifty miles of which city he is to fight George Rooke on the 17th of June. He will go immediately to McKee's Rocks, five miles from Pittsburgh, where he will go into active training, under the direction of Johnny Newell and young Donnelly. He has been in preliminary training here for some weeks past, and reduced himself from 225 to 190 pounds. He expects to take off twenty more pounds of flesh and fight at 170. Barney Aaron and Owney Gagen will second him. It is expected that Joe Coburn and some other eastern bruiser will second Rooke.

OBITUARY.

DEATH OF C. S. GLENN.

COLUMBUS, O., May 16.—Charles S. Glenn, proprietor of the Columbus Gazette and owner of the Gazette Printing Establishment, died to-day, of consumption. Mr. Glenn has been a resident here for many years and was a very public spirited and much respected citizen.

HON. THOMAS BIDDLE.

PHILADELPHIA, May 16.—A telegram received here yesterday from the Consul at Panama announces the death at Guayaquil, on the 7th inst., of Hon. Thomas Biddle, United States Minister to Ecuador.

The Haytien Conspiracy.

NEW YORK, May 15.—The following from Kingston, Jamaica, May 8th, gives the story of the last so-called revolution in Hayti: Saturday, the 1st of May, was celebrated the annual Agricultural Festival throughout Hayti. On the evening previous President Domingue was advised of a conspiracy to assassinate him the following day, with a view to establish Monplaisir Pierre in the Presidency, supported by General Brice and General Canal. While the President was in church three separate bodies of troops were sent to arrest the conspirators. General Brice, residing immediately opposite the British Consulate, was first surrounded. He refused to surrender, and shot down four Haytien officers before he was fired upon and mortally wounded, when he crept into the British Consulate and died. A shot [illegible] for General Brice killed the servant of the British Consul. The servant of General Brice was also killed. When the troops reached the residence of Monplaisir Pierre who was the candidate for the Presidency whom General [illegible] he repulsed them [illegible] he retired to the attic and [illegible] wounded, when [illegible]. When General Canal was [illegible] he was in the vicinity of the American [illegible] at the head of a body of soldiers. These on seeing the [illegible] [illegible]

CHICAGO.

THE REFORM EPISCOPAL CHURCH CONVENTION.

CHICAGO, May 15.—The Council of the Reformed Episcopal Church yesterday directed the appointment of a committee to prepare the translation of suitable parts of the prayer book for the use of the German congregation, and a committee to recommend the best means for the permanent support of general and missionary objects of the church. The question as to the place of meeting of the next council was made the special order of next Saturday. Rev. Dr. A. R. Thompson, the Brooklyn delegate from the general Synod of the Reformed Dutch Church of America, stated that his venerable church sent its official and Christian greetings as a duty and right. He rejoiced that the histories of the church of Holland would resume the relation of Christian sympathy and communion with a church, Episcopally organized. His church rejoiced to thus publicly say amen to their reformed declaration of principles set forth about a year ago.

Bishop Cummins gave fervent thanks for this first official recognition of his church, and the Council sang, "Blest be the tie that binds."

On motion, a delegate and an alternate were ordered to be annually elected and commissioned to convey to the General Synod of the Reformed Church in America, the Christian salutation of the Reformed Episcopal Church. Rev. Marshall B. Smith was appointed delegate, with Rev. Dr. Nicholson as alternate.

A part of the session was devoted to the consideration of the articles of religion as revised and reported by the Committee of Doctrine and Worship. The first, of the sufficiency of the Holy Scriptures for salvation, led to a general debate on the propriety of a revision which was almost unanimously sustained, though it was resolved to retain as far as possible the ancient numbering. Three articles were provisionally accepted by an unanimous vote, after slight additions to the forms reported. These were entitled "Of the Holy Trinity," "Of the Word or Son of God," "Of the Resurrection of Christ and His Second coming." An article on Christ's descent into hades was stricken out on motion of Bishop Cheney, with but few dissenting votes.

The consideration of the articles of religion was then begun.

At the Reformed Episcopal Council to-day, the Treasurer made a report showing a balance in the treasury of $313. Two thousand two hundred and fifty copies of the prayer book have been printed during the year. The Council voted thanks to the Treasurer, Thomas H. Powers of Philadelphia, for his generosity in printing and distributing those books. The question of printing and circulating the Special Services was committed to the Committee on Doctrine and Worship, by general consent. The next session of 1876 will be held in Ottawa, Canada.

Commodore William B. Whiting, an aged invalid, was welcomed by the Council, and expressed his sympathy therewith in behalf of Christian unity.

The special order of the day was the election of a missionary bishop from the Pacific coast. Finally it was decided to appoint a committee to report what additional agencies were needed for the more vigorous prosecution of the work of this church. The committee consisted of Bishops Cummins and Cheney, Rev. Dr. Nicholson, Rev. J. Howard, and Messrs. Smith Woodford, Tyng and Meriwether. The consideration of the articles of religion was then resumed. The article of faith as amended and accepted by Dr. Nicholson and Lieutenant Governor Woodford, was accepted by a vote nearly unanimous.

SPORTING.

LAST DAY'S RACES AT TERRE HAUTE.

TERRE HAUTE, May 15.—The spring meeting of the Terre Haute Trotting Association closed to-day with a running race for $150, mile heats, best two in three. Glosier won in two straight heats, Queen of Diamonds second, and Queen of the West, distanced. Time 1:48½, 1:53.

THE LEXINGTON RACES.

LEXINGTON, KY., May 15.—The consolation purse $300, mile heats for beaten horses, was won by A. Keene Richards' ch. f. Mistletoe, four years old, by Gilroy. Time 1:55¼, 1:58¾.

The second race, 1¾ miles, purse $400, was won by Robinson, Morgan & Co.'s J. F. McCallis ch. c. Bigfellow, 4 years old, by War Dance. Time 3:20¾.

The third race, two and a half miles, purse $650, was won by A. Keene Richard's ch. c. Monmouth, 4 years old, by War Dance, a walk-over.

The fourth race, purse $250, was won by Robinson, Morgan & Co.'s and R. Caleton's b. c. Millionaire, 3 years old, by Planet. Time 2:25¾.

FIRES.

LOSS OF LIFE AT HOUSTON.

HOUSTON, TEXAS, May 15.—The residence of Alderman John Meagher was burned to-day. Loss $12,000; insurance $3,000. Three men, unable to escape from the building, were burned to death.

FIRE AT MITCHELL, IOWA.

DUBUQUE, May 15.—Mitchell, Iowa, was visited by a disastrous conflagration last night, which destroyed J. C. Prem's elevator, two grain warehouses, and an adjoining office. Loss, 3,000 bushels of grain, about $1,500 in machinery and stock, and $6,000 on the building. Insurance, nearly $8,000.

AT WILMINGTON, OHIO.

CINCINNATI, May 16.—A fire at Wilmington, Ohio, this morning burned Taylor's carriage factory and the dwelling adjoining. Loss about $5,000; no insurance.

AT LOOMIS STATION, MICHIGAN.

CHICAGO, May 15.—An Inter-Ocean special says a fire last night destroyed the saw and shingle mill of Wise & Loomis, located at Loomis Station, Michigan. A large quantity of lumber was also destroyed.

WHISKY.

WHISKY RETURNING.

NEW YORK, May 15.—Collector Freeland, acting under orders received from Washington, detained about 150 barrels of whisky in Brooklyn. It had recently arrived from the West and is supposed to be "crooked" whisky. Collector Freeland is now inspecting all rectifying establishments in his district. There are fifteen such places, and the object of the inspection is to ascertain whether any of the so-called "crooked" whisky has been received. Since the seizures were made public the owners of such [illegible] in the district have notified the Collector of their intention to run to their full capacity. All the distilleries that have been closed or partially closed will again resume operations.

SEIZURES AT BOSTON.

BOSTON, May 15.—As a result of the investigation into the liquor establishments of this city, about five hundred packages of spirits, valued at $[illegible], the property of thirty different firms, were seized to-night.

Board of Foreign Missions.

NEW YORK, May 15.—The anniversary services of the Board of Foreign Missions of the Presbyterian Church were held this evening. Rev. Dr. [illegible] presided. The Secretary reported the expenditure for the past year as [illegible] [illegible]

A WONDERFUL DISCOVERY!

A NEW MOTOR!

The Days of Steam Probably Numbered.

[EDITORIAL CORRESPONDENCE.]

PHILADELPHIA, May 12, 1875.

There is living in this city a remarkable man—one who is a product of nature's noblest works—a man who has given years of toil and study endeavoring to discover a more convenient and cheaper substitute for steam. He was born in Chester county in the neighborhood of this city. He is a machinist by profession, and physically he could be taken for a model of Vulcan, for he is possessed with an immense amount of muscular strength—having been known to lift twelve hundred weight. Mentally, he is endowed with that which is more than a substitute for a liberal education. The name of this man is John W. Keely,—a name which I firmly believe will be known when that of Fulton, Watts, and Stevenson will have been forgotten.

For years Mr. Keely has been endeavoring to discover in the works of nature a hidden power or motor, which could be utilized for the benefit of mankind, and he has succeeded! The result of his discovery is so great, so marvellous and stupendous, that the practical mind will accept my statement with a feeling of incredulity. But I have seen his engine in operation, propelled by a heretofore unknown vapor of immense pressure, which is created from a small quantity of water with a certain admixture of air, and which is *produced purely by mechanical means,* without any chemicals whatever, without the aid of galvanism or electricity, without heat, and *without cost* aside from wear of machinery and expense of an engineer! So what I have seen with my own eyes I must believe.

Before attempting to describe the apparatus for producing this vapor,—or rather, in the language of an enthusiastic gentleman interested in the discovery—"the apparatus for *utilizing* the hidden power contained in water and air,"—I will give a brief sketch of the inventive career of Mr. Keely. For years he has been imbued with the belief that a motor was hidden somewhere which could be utilized and used in the place of steam comparatively without cost. He started out by first endeavoring to use the pressure of the atmosphere as a motor and succeeded. He constructed a peculiar engine, which was propelled by that pressure, and which was called an "Air Engine." He had it running for a number of months. The plan upon which this curious engine was constructed I cannot fully and satisfactorily explain, for I never saw it. But gentlemen, in whose words I have implicit confidence, have seen it running and have endeavored to describe it to me to the best of their ability. The nearest approach I can give of a description, is to say that the piston rod is fastened by a circular metal plate to an India rubber diaphragm on the top of the cylinder. By some mysterious arrangement, only known to Mr. Keely himself, the air is exhausted *from* the cylinder and the vacuum thus formed compels the diaphragm to bulge inward several inches, and when the air is let in the diaphragm bulges outwardly, in that way working backward and forward several hundred times a minute, making that number of revolutions in the engine. How he managed to make fifteen-pound pressure of the atmosphere do more than overcome an opposition equal pressure of that same atmosphere, is a mystery. He did this in violation of the universal mechanical law that in order to produce a vacuum you must have more than atmospheric pressure to accomplish that object. He did this without the aid of electricity, galvanism or heat. But he did have the aid of a minute quantity of water, which was used in some way to produce the vacuum. As near as I could get at it, the engine was propelled somewhat on the principle of a hydraulic ram, where the pressure of a head of water is brought to bear upon a large piston, which in turn operates upon a smaller piston or plunger, thus enabling it to force a smaller stream of water higher than the head of the water that works the machine. But we know that a hydraulic ram submerged under water could not be made to move. Therefore, how could an atmospheric engine constructed on that principle be made to run while being submerged in the atmosphere, with an equal pressure all around it? But Mr. Keely did succeed in making such an engine work purely by atmospheric pressure, without electrical or chemical aid, or without heat, and he can produce evidence to prove this sufficient to hang a regiment of men.

It was supposed that this engine would become a success after certain improvements had been made, and do away with steam, at least in the use of small steam engines. Believing in this view, Mr. Keely continued the work of investigating and perfecting his engine. The model of this air engine occupied a space less than a cubic foot, and made 800 revolutions a minute with such force that the strongest man, with his hands encased in a pair of gloves, could not stop it by holding on to the fly wheel. The great objection to this engine, as it was then constructed, was the apparent necessity, on account of a piston not being tight enough, of using an India rubber diaphragm in its place, which would make it impractical for large engines. But while experimenting upon and endeavoring to do away with the use of the diaphragm, Mr. Keely accidentally discovered another new motor, a new and heretofore unknown vapor! How he discovered this vapor, of course, like a sensible man, he kept to himself till he could cover his invention with a patent, to prevent unscrupulous men from stealing his discovery. He saw plainly that this vapor could be compressed and made to give almost an unlimited amount of pressure, and that it could be made to propel an engine precisely as a steam engine is propelled, and of course it would be superior to his atmospheric motor, because it would do away with the objection of using a diaphragm.

Mr. Keely forthwith set himself to work to construct a mechanical apparatus to produce this vapor, and after a vast amount of experimenting he succeeded almost beyond his expectation. All the description I can give of the apparatus is to say that it is called a "Generator" or "Multiplicator," that it is about three feet high, two feet long and thirteen inches deep, made of brass and wrought iron in a heavy and strong manner, the whole of which consists of a series of iron chambers, cylindrical in form, connected by pipes furnished with various cocks and valves. This multiplicator was suspended from the ceiling by a chain three feet above the floor, showing it to be entirely disconnected with anything else, except the pipe connecting it with the "Receiver." The vapor generated is conveyed to the receiver and from the receiver it is conveyed by a "feed pipe" to the engine. The receiver is made out of wrought iron, two inches thick, capacity about twenty gallons, and shaped like a soda fountain. The peculiarity of this receiver is, it is made of wrought iron, without a rivet, and entirely welded. The question is how could a receiver, shaped like a soda fountain, be made of wrought iron, entirely welded without an anvil inside, and without a rivet? Such a receiver was made for I saw it with my own eyes, and saw it was of wrought iron. It would appear as though Mr. Keely was doing impossibilities. The engine is the ordinary engine such as is used for steam.

The peculiarity of this vapor is, that it can only be used to the best advantage at a pressure of 20,000 to 30,000 pounds to the square inch! The engineer, when he reads this statement, will say "that is an utter impossibility!" "No boiler," or rather reservoir, could be constructed to withstand such a gigantic pressure! It would tear an engine to pieces at that pressure! No pipe would be strong enough to stand that pressure! No valve or cock could be made tight enough to resist that pressure! It would be impossible to control that awful pressure! A vapor that can produce such a pressure, necessarily must be thinner than air, and with a pressure of 20,000 to 30,000 pounds to the square inch, this thin vapor would press itself through the pores of the metal, holding it. When I heard, several months ago, that Keely's motor was run up to that immense pressure, I expressed precisely the same views of it being impossible to make that motor practicable for use, for the same reasons given in the foregoing sentence. But through the inventive and mechanical genius of Mr. Keely those apparently insurmountable difficulties were swept away, and he is enabled to control his vapor at that immense pressure and run his engine with precisely the same ease at which the ordinary steam engine is run. I will state in detail how these difficulties were overcome:

First. How could a "receiver" be made strong enough to stand the pressure? It is well known that the weakest point of a boiler is where it is riveted. If a boiler could be made entirely of welded iron without rivets, it would be one-third stronger, consequently a welded "receiver" has that advantage in strength. The smaller the boiler the stronger it is. A boiler twenty-four inches in diameter will stand twice the pressure that a boiler forty-eight inches in diameter can of the same thickness of iron, or three times the pressure that a boiler seventy-two inches in diameter can. Consequently a "receiver" of only about fourteen inches in diameter must be so much stronger in proportion than the large-sized boiler. A steam boiler is weakened with use by the action of intense heat, corrosion, expansions and contraction, collection of scale inside, accumulation of sediment and dirt, and is liable to to explode by sudden expansion of steam caused by water being too low, &c. The "receiver" preserves an equal temperature and is not exposed to any of the difficulties that the steam boiler has—it being filled constantly with a cool, dry and clean vapor. This alone gives the "receiver" at least more than double the strength of the boiler, everything else being equal. Then, above all, the receiver is about two inches thick, of solid wrought iron. The statement is made that guns made of thicker metal burst at a pressure of 17,000 pounds to the square inch. How could a receiver made of thinner metal hold 30,000 pounds pressure? The answer to be made to this is as follows: The explosion of powder being sudden is more powerful in its effects than the steady pressure of vapor in a receiver. Then, again, the bursting of cannon is caused by the intense heat of the burned powder expanding irregularly the metal. In the "receiver" the metal has a uniform heat, or rather coolness.

Second. How can the metal be made sufficiently tight to prevent this thin vapor being forced through by that immense pressure? Mr. Keely explained this to me by saying that that was his principal difficulty. He overcame it by planishing the receiver on the outside, thus closing up the pores, and by putting certain chemicals with water on the inside and corroding the metal, thus closing the pores inside with oxide.

Third. How could that immense pressure be reduced down to the ordinary steam pressure in order to run an engine? That is the simplest thing in the world to do. The vapor passes through a feed pipe the bore varying in size from that of a knitting needle to an eighth of an inch in diameter and upward, according to the size of the cylinder of the engine. For instance, in a 10-horse power engine a pipe with a bore of the knitting needle size will drive it. The vapor as fast as it gets into the cylinder through that small aperture, expands and reduces itself down to the required pressure by the time it is cut off. To illustrate. A tenth of a pint of vapor at 30,000 pounds pressure, we will say, will get through the pipe before it is cut off, into a cylinder of say two gallons capacity. This vapor expands and fills the cylinder, thus reducing its pressure in the same proportion as two gallons is to a tenth of a pint.

Fourth. How can a pipe stand that pressure? The smallness of the brass feed pipe is its strength.

Fifth. How can a stop cock or valve be made tight enough for that pressure? The smallness of a steel throttle valve, size of the end of a wooden lead pencil, jammed home by the same amount of power brought to bear on the steam throttle valves, is abundantly sufficient to hold the vapor.

Sixth. If the Receiver should burst at a pressure of 30,000 pounds, would it not be more disastrous in its effects than the bursting of a steam boiler? When a boiler explodes on a steamer, we all know it tears the whole ship to pieces. When a large gun explodes on a man-of-war, it only damages the immediate neighborhood of the gun. The explosion of a receiver would have a less disastrous effect than the explosion of a gun, for this very extraordinary reason, that when the vapor comes in contact with the atmosphere to any great degree it *ceases its expansion,* and goes back instantly to its original state—namely, air and water. Gunpowder and steam keep on expanding after they come in contact with the atmosphere. Consequently the vapor is far less dangerous than steam or gunpowder.

Seventh. The objection is brought up that the vapor at 30,000 pounds pressure would cut the metal in escaping or passing through the throttle valve. The vapor being so much thinner than air, and its being dry and cool, has far less cutting power than steam.

From the foregoing it will thus be seen how Mr. Keely has succeeded in overcoming the apparent difficulties. How he produces the vapor from his "multiplicator," or rather "generator," is only known to himself and two other gentlemen, one of whom is Charles B. Collier, Esq., a well-known patent lawyer of Philadelphia. The secret will not be divulged till the claims of the inventor or rather the discoverer are fully protected by patents in this country and in Europe. The multiplicator will work automatically and keep the receivers supplied while the engine is running. For the larger classes of engines, it is intended to multiply the number of receivers according to the size of the engine.

An exhibition of the multiplicator and engine was made in the presence of the following gentlemen: Mr. Charles B. Collier, patent lawyer; William Boekel, mechanician; William J. Rutherford, chief engineer of the United States Navy; J. Snowden Bell, mechanical engineer; Mr. John Stiltz, Mr. James S. Yarnell, Mr. J. H. Anders, Mr. E. Raffsnyder and Mr. Charles Schuellerman, all of Philadelphia, and Mr. J. S. Andrews of New York City. Mr. Boekel assisted in the manipulation of the apparatus, Mr. Rutherford made the calculations of the pressure upon the piston by the register of pressure, and Mr. Bell made a detailed record of the proceedings and operations. I will copy from Mr. Collier's printed report of this exhibition a summary of facts that were clearly established, with the certificates signed by Messrs. Boekel, Rutherford and Bell, and a communication from B. Howard Rand, M.D., professor of chemistry, showing that the vapor at present is unknown to the chemist. It will be borne in mind by the reader that this exhibition was made with the first multiplicator made by the inventor, that it only creates vapor with a registered pressure of about 2,000 pounds to the square inch; that the new multiplicator now being made by Mr. Keely is expected to create a pressure equal to 30,000 pounds to the inch.

1st. That the inventor did produce a series of evolutions or "expulsions" of a gaseous or vaporic substance, having an expansive energy of, say, 2,000 pounds to the square inch.

2d. The production of this power, from the time of establishing the water columns in the mechanical structure termed by the inventor his "multiplicator," occupied an inappreciable period of time.

3d, The passage of this gas or vapor from its point of generation to its point of utilization (in the experiments above referred to, say twelve feet) was also inappreciable.

4th. The development or production of the force was unattended by any appreciable noise.

5th. Before the commencement of the operations the tests applied to the apparatus, to-wit, blowing through its several connections, flooding it with water and discharging the water, evidenced that it contained no chemical compounds in unstable equilibrium, or of explosive character, the equilibrium of which, in the one case, could be disturbed so as to evolve gaseous products, or the explosion of which, in the other case, could be produced by the introduced water.

6th. After the test referred to in the above paragraph had been applied, it would have been impossible for the inventor or any one, to have introduced chemicals or other substance than water without detection.

7th. No heat was employed, no electricity, no galvanic action, nor was heat, electricity, or galvanic action, discernible as resultant of the operation, except that electric sparks were observed in the spur gearing of the engine, which was propelled by the vaporic force, such evolution of electricity, which was but slight, being obviously caused by frictional contact of the metallic surfaces of said gearing.

8th. The water which was introduced into the multiplicator came direct from the hydrant, under a pressure, as indicated by a gauge applied to the hydrant, of twenty-six and a quarter pounds to the square inch.

9th. The water, before its admission to the multiplicator, and after each operation upon its withdrawal from the multiplicator, was drank by myself and by others of those present, and exhibited no taste nor smell, and manifestly came out of the multiplicator as it went in, free from all substances other than those contained in the water of the Schuylkill River, from which it came.

Tenth. The vaporic or gaseous production, I, as did others present, smelt of and freely inhaled, and it had neither perceptible smell nor taste. I applied a burning candle to it, and it did not burn, nor did it extinguish the flame of the candle.

Eleventh. After the conclusion of the experiments, the multiplicator was dismantled, and the interior of it examined, and there was no residuum within it indicative of the presence of chemical or explosive compounds, or other substances than air and water.

Twelfth. The operations were conducted in a gas-lighted room, and a lighted candle was held by myself, in close proximity to the multiplicator, during the entire period of the operations.

13th. The inventor, from first to last, afforded every facility for the closest investigation, and proposed from time to time, to repeat or duplicate, as often as might be desired by any one present, either of the several operations, and afforded also every facility for the determination, to the satisfaction of those present, of the truth of his statement, as contained in his communication addressed to the writer hereof, which accompanies this report, and from which communication I now quote, to wit: "The non-presence of heat, electricity, galvanism, chemicals or preparations of any kind," other than his mechanical structure, termed a multiplicator, and air and water.

The object of this communication, for obvious reasons, is not to make known the precise nature of the invention of Mr. Keely, nor will this be done until the specifications, drawings, models, etc., now in progress, necessary for the procuration abroad and in this country of Letters Patent are completed and deposited; but I think I may say safely, that no person who witnessed the exhibitions, hereinabove described, left the room in which they were conducted with a doubt as to the perfect integrity of the inventor, or unimpressed by the extraordinary character of his invention.

In conclusion, I would remark that the operations above referred to were conducted in what is known as the "old multiplicator" of Mr. Keely, and which having been, by reason of its want of strength, dismantled some time since, was put together for the special occasion of this practical exhibition. In order to ensure safety, the operation was conducted, as stated by Mr. Keely, under restrictions as to degree of evolution, confining the production of the force within its lowest ranges.

The new multiplicator is now rapidly approaching completion. It is made of great strength of parts, and designed to be of sufficient strength to withstand the pressure of the vaporic or gaseous evolution of highest degree and greatest expansive energy, estimated by the inventor as probably equal to thirty thousand pounds and upward per square inch. It is further designed to demonstrate the continuity of the vaporic or gaseous development, and to be automatic in its action, and from that which has been accomplished by the inventor, there is, seemingly, no reason to doubt that he will attain that which he proposes to accomplish with his new mechanism.

In conclusion, I have to recommend that his request, as contained in his communication hereinbefore referred to, addressed to myself, be strictly observed, and that he be not importuned for a repetition of his experiments, inasmuch as this will delay his operations, and such time as he is not actually employed in his own workshop will be most advantageously to him, and to all persons concerned, employed in directing his mechanicians in the completion of his apparatus, and in aiding my engineering assistant, Mr. Bell, and myself, in the preparation of his patent drawings, specifications, etc. Respectfully submitted.

CHARLES B. COLLIER.

The undersigned were present during the entire exhibition referred to and described in the foregoing report of Mr. Collier. This report we have carefully read and examined.

In its narration of facts it is correct. The conclusions, as stated by Mr. Collier, under the heading "Summary," we fully indorse, as being, in our judgment, the correct conclusions deducible from the exhibitions described by him, and witnessed by us together with him.

WM. BOEKEL, Mechanician.
WM. H. RUTHERFORD,
Chief Engineer, U. S. N.
J. SNOWDEN BELL,
Mechanical Engineer.

[Communication of B. Howard Rand, M. D., to Charles B. Collier, Esq.]

The foregoing statement, signed by Chas. B. Collier, Esq., has been submitted to me by him and my opinion is requested as to whether or not the results stated therein to have been accomplished by Mr. Keely, can be accounted for by any known chemical agencies, such as the disturbance of chemical substances in unstable equilibrium, by the action of water or air brought in contact with them in the apparatus described.

In reply to the question addressed to me, I would state that I am unable to account for the result stated to have been produced by any known chemical decomposition.

The celerity of the operation, the absence of noise, the absence of heat, electricity or galvanic action as a producing clause, and the like absence of heat, electricity or galvanic action as resultants, together with the negative qualities of the produced gas or vapor, lead me to the conclusion that the result alleged to have been produced was by some agency or power not known at present to chemists.

I have not seen the apparatus, and my views are given simply upon the foregoing report of Mr. Collier.

B. HOWARD RAND, M. D.,
Prof. of Chemistry in Jefferson Med. Col.

According to this summary of Mr. Collier's report, it will be seen that Mr. Keely has discovered a vapor unknown to the chemist; that he has succeeded in running an engine with that vapor; that he clearly proved to the gentlemen present that there could be no chemicals or electricity used, and that the vapor was created by a secret mechanical process. Mr. Oscar A. Childs, of this city, saw the engine running last March, and he and myself can both testify that the vapor escaping at the exhaust of the engine felt like cool air, and that it was devoid of smell.

The indications are a hundred times greater that this new motor will supercede steam, than it was when Watts first made his steam engine that it would eventually move the world. The stupendous importance of this great discovery of Mr. Keely, provided it will supercede steam, as *I believe it will,* can be gathered from the fact that the power to run an engine will *cost nothing* aside from the wear of the machinery and the wages of an engineer. Of course such a motor would almost revolutionize commerce and manufacture throughout the world. It would reduce freight and passage across the ocean fully one-half. It would enable a steamer—or rather a Keely vapor ship—to sail around the globe without coaling. It would reduce the expenses of a first class ocean steamer sailing between New York and Europe, counting in several hundred tons freight room saved by doing away with coal, and bulky boilers, and counting in the saving of expensive repairs of boilers and renewing them every five years, over $200,000 per annum! A Keely motor engine would only weigh one-fifth of the weight of a steam engine and boiler of equal power, consequently it could be used for propelling carriages over the roads and street cars, etc.

I could tell of other wonderful things Mr. Keely has done, and what he proposes to do, but I will not incur the reputation of being an enthusiastic visionary what-do-you-call-him. Time will soon decide the question of the practicability of the invention. The company who are now interested with Mr. Keely propose to have an engine on public exhibition next fall, and they propose to drive a portion of the power in the halls of the Centennial exhibition with a Keely engine next year.

In conclusion I wish to express my acknowledgment for courtesies extended to me by Messrs. Keely, Collier, Schuckers and Sergeant, gentlemen who have an interest in the invention, and particularly for permission to publish this account of the discovery—the first accorded to any newspaper. Heretofore they have kept the discovery of this motor quiet and declined to give a report of it to the press, preferring to be unmolested till the matter had reached a shape to justify its being published.

E. C.

Anniversary.

NEW YORK, May 16.—The anniversary service of the American Congregational Union was held this evening in the Church of the Pilgrim, Brooklyn. Rev. Dr. Storrs preached the anniversary sermon, in which he minutely reviewed the workings of the Union during the past year, which presented more than cheerful results. The following is from the statement of the Union: Number of churches aided in building since the work was undertaken, 925; amount paid therefore, $600,000. The churches aided are scattered over thirty-four States and Territories. The aided churches have contributed $28,000 to the treasury of the Union. The number of Congregational Churches outside of New England now exceed those in it by five hundred.

Shack Nasty Jim, Scar-Faced Charley and Steamboat Frank passed west on the morning train for Baxter Springs. They were attached to the troupe of Colonel Meacham and Captain Applegate in the Eastern tour, but the tour failed to be a financial success. The troupe has disbanded, and the Indians are returning to their homes. Meacham and Applegate are still in the East. The Indians report having seen President Grant; but, financially, they are broke.—*Kansas City Journal.*

EVELAND LEADER, MONT

A WONDERFUL DISCOVERY!

A NEW MOTOR:

The Days of Steam Probably Numbered.

[EDITORIAL CORRESPONDENCE.]

PHILADELPHIA, May 13, 187[illegible].

There is living in this city a remarkable man — who is a [illegible] of [illegible] was wrecked, one side of it being blown entirely out, and the roof being also carried away.

(340.) — A boiler belonging to James C. Moore exploded, on November 26th, near Ypsilanti, Mich. Louis Moore was fearfully injured, but it is believed that he may recover.

(341.) — Two Northern Pacific locomotives collided, on November 27th, in a cut some twenty-one miles east of Missoula, Mont. The boiler of the west-bound locomotive exploded, killing Fireman P. J. Murray, and injuring Engineer F. M. House.

(342.) — On November 27th a boiler exploded on the river steamer, *T. C. Walker*, at Turner's Landing, some fifteen miles below Stockton, Cal. W. A. Blunt, Jeremiah Daly, Mr. and Mrs. Watson Henry, Ferdinand Ward, John Holdsberg, and John Tulan were killed. Louis Brizzolana, John Burns, James Corcoran, Coratti Dominici, G. Foppiano, John Figoni, Edward Paul Jones, Martin McCaffery, and George P. Smith were severely injured. Some fifteen other persons also received lesser injuries. The pilot house and all the forward works of the steamer were wrecked.

(343.) — Two boilers exploded, on or about November 30th, in Harned Bros.' spoke and handle factory, at Guthrie, Ky. Nobody was injured.

The Passing of Keely.

John Worrell Keely, the inventor of the impossible combination of spokes and wheels and pipes that was long notorious under the name of the "Keely motor," died in Philadelphia, on the 18th of last November, at the age of 71 years. We have never had the least idea that there was, or could be, any merit whatever in his "invention"; but, on the other hand, we have never been able to come to any definite conclusion concerning his real object in putting together such fearsome aggregates of iron and copper and other unoffending metals. The *American Machinist* says, in a recent issue, that the ways of Mr. Keely "were not the ways of an honest and truthful man, nor the ways of an inventor or discoverer of anything great; and that he was so long successful in his career is one of the marvels of the age. All his apparatus is well deserving of a place in some museum where it may stand as a warning to the over-credulous, whom, like the poor, we have always with us." This view of the case has much to justify it, and yet it somehow fails to be entirely satisfying. If Keely was a rogue, who knew well that he had nothing of value, it would be reasonable to expect him to float his company for a large amount, and then disappear. That is the prescribed *modus operandi* for such exploits. The genuine gold-brick artist does not spend a quarter of a century in a workshop. We think it is more or less probable that Keely believed (for a long time, at any rate, though perhaps not to the end) that he was on the track of something full of promise. His peculiar and extravagant verbiage, devoid of sense to the ordinary hearer, was doubtless due, to some extent, to his limited education. Most or all of his sesquipedalian words he had seen somewhere, and had appropriated to his own purposes, without knowing just what they meant. We think it doubtful if any man who *did* know their meaning, could string them together in the wondrous fashion in which they issued from him. We should say, in a general way, that Keely probably did not understand the difference between the exerting of a vast pressure against a fixed object, and the production of motive power, by causing such a force to *push* something continuously before it. We are more inclined to regard Keely as an uneducated man, not quite mentally sound, who thought, for a long time at any rate, that he was on the road to an important discovery; and who resorted to trickery when it became necessary to *show* results of some kind, in order to coax from the capitalists' pockets the dollars that he vainly hoped would enable him to achieve the same ends *without* trickery. It does not appear likely that he could apply himself so diligently to his one idea for a quarter of a century, without eventually satisfying his own mind that his longed-for goal was unattainable; and so towards the end he may have given up his hopes, and, weighed down by increasing years, he may have deliberately defrauded his remaining backers, at the last, in order to spend his declining years in comfort. We print, below, an extract from the April issue of *The Cosmopolitan*, which tells something of Keely and his ways. The original article from which this extract is taken is finely illustrated with half-tone pictures, and we commend it to the attention of persons who may be interested to know how Keely and his engines looked.

[Extract from THE COSMOPOLITAN.]

To understand Keely's history let us revert to the year 1872, when the Keely Motor Company was organized, and the enthusiasm over the "new force" brought into the fold men whose very names at that period stood for common sense and perspicacity. At the Fifth Avenue hotel, New York city, a meeting was held, presided over by Edward B. Collier, a lawyer, who in his particular line of patent attorney had from time to time come in contact with inventors struggling for a hearing. The meeting was composed of bankers, merchants, scientists, and practical engineers, and the result was satisfactory, from Keely's point of view. The project gained substantial assistance. Money was subscribed, and the following day there was placed in the hands of Keely a check for ten thousand dollars; and this, to do him justice, he immediately expended for machinery, or material necessary for the construction of his peculiar apparatus. In fact, whatever the vagaries of the man, however much his ideas may have been beyond the limit of common sense, that Keely spent the money which he obtained in experimental investigations cannot be denied, even by the most strenuous of his opponents, at that time or now. Small consolation this, to the many who fell victims to the smoothness of his speech or the incomprehensible language which he employed. At any rate, after being launched, the motor project soon found itself in deep water. Funds began to get low, and bankruptcy followed. Luckily, a friend now appeared on the scene. From one time to another, Keely's patroness, Mrs. Bloomfield Moore, who was left the executrix of her husband's will, advanced the "inventor" large sums out of the fortune accruing to her from her husband's estate. Now and then a halt was called, to be sure, but the persuasiveness of the "inventor" would make her rally to his assistance once more, and another lease of life would be accorded to the motor.

A great public exhibition was given in Philadelphia, but while enthusiasm ran riot among a certain clique, skeptics were plenty, too, and the persistency with which Keely would refuse to admit any one into his secret raised suspicion — which, nevertheless, did not prevent a famous Philadelphia physician from advancing his individual check for ten thousand dollars. This was in 1881. In 1890 the stockholders began to grumble, and something had to be done to save the cause. Keely had just declared that he was on the eve of success; that another step would bring him to the threshold of the mystery that until then had been a mystery even to him, as he admitted. Again his remarkable force of character saved the day. The work was continued and one machine followed another, only to be thrown aside for some new contrivance destined to assist in the revolutionizing of the existing order of things. One individual who visited Keely's place said that a pint of water poured into a cylinder seemed to work great wonders. The guage showed a pressure of more than fifty thousand pounds to the square inch. Great ropes were torn apart, iron bars were broken in two or twisted out of shape, and bullets were discharged through twelve-inch planks by a force which could not be determined. Keely also declared that with one cup of water he would be able to send a train of cars from Philadelphia to San Francisco, and that to propel a steamship from New York to Liverpool and return would require just about one gallon of the same very harmless and ordinary fluid.

It was almost worth the price of falling a victim to hear Keely theorize, expostulate where it became necessary, and survey his audience with one of those superior glances which were meant to show that he half pitied those who failed to understand his vocabulary.

After the death of Keely, the "motor" was removed to Boston, where it now reposes in the safe-keeping of one of Keely's friends. Mrs. Bloomfield Moore, who had supplied large sums of money for the furtherance of the project, died shortly after Keely himself, and her son, Mr. Clarence B. Moore, then resolved to expose the trickery which he was convinced lay at the bottom of the thing. Keely's house was rented, and investigations were begun. Leading Philadelphia scientists assisted in the work, and the first discovery came in the shape of an immense steel globe. Almost covered with dirt and rubbish, it was held down in the earth of the cellar by heavy beams. When relieved of its incumbrance, the sphere was lifted out of its resting-place, and subsequently was found to weigh more than three tons. On the top of the globe a threaded hole was discovered. Immediately near the sphere was found an iron pipe, which led for a distance of more than fifteen feet into the space under the front room. Here was discovered a pit lined with wood and covered by a trap-door. Fresh ashes gave evidence of a careful demolition of material not thought valuable enough for removal, and yet necessary to have out of the way. In these ashes, however, were found short sections of what at first was considered to be wire, but subsequently proved to be brass tubing. A large amount of glass tubing was likewise found in the debris. The fragments left behind gave striking evidence of the care exercised in removing the Keely motor machinery from its home. The next day, still greater results rewarded the searchers of the premises. The room in the rear was curiously raised above the others, and this was the apartment in which Keeley conducted all those experiments which had puzzled the world until his death. When the floor was torn up, the revelation was complete. Through the joists, in holes specially cut for the purpose, ran a short brass tube. Other tubes were discovered also, and the whole went to show that the motor had been connected, here, with the spherical contrivance in the cellar. In the presence of Prof. Arthur W. Goodspeed, professor of physics at the University of Pennsylvania; Prof. Carl Hering, one of the most eminent electrical engineers in the country; Prof. Lightner Witmer, professor of experimental psychology at the University of Pennsylvania, and Mr. Moore, who had the investigation in charge, the nature of what had been laid bare now came in for earnest consideration. It was determined beyond a doubt that the tubing, and the spherical reservoir found in the cellar, stood conclusively for the argument that compressed air might easily have accomplished all that had been demonstrated so mysteriously by Keely.

WE have received from the author a copy of François Sinigaglia's *Application de la surchauffe aux machines à vapeur* ("The Application of Superheating to Steam Engines"). It consists of a series of papers on the subject, which are reprinted from the *Revue de Mécanique*, and is a valuable contribution to the literature of superheated steam.

The Locomotive.

HARTFORD, APRIL 15, 1899.

J. M. ALLEN, *Editor.* A. D. RISTEEN, *Associate Editor.*

THE LOCOMOTIVE *can be obtained free by calling at any of the company's agencies.*

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THE circulation of THE LOCOMOTIVE has increased so greatly, that we have been obliged to introduce radical changes in our mailing department. In revising our lists for this purpose, it is probable that more or less mistakes have been made, and we shall consider it a favor if our readers will notify us of any errors that they may detect in the addresses, as we desire to have them all as correct as possible.

WE acknowledge, with much pleasure, the receipt of the *Report*, for 1898, of the chief of the Massachusetts district police, which contains, among other information, the reports of the various state boiler inspectors for the year. Massachusetts has a law requiring engineers and firemen to be licensed. It appears from the present report that 5,655 applicants for such licenses have been examined, with the result that licenses were issued in 3,571 cases, and refused in 2,084 cases. Two licenses were also revoked — a surprisingly small number, when the total number that were granted is considered.

"Magazine Science."

All science may be divided into two broad classes; namely, into science that *is* so, and science that *isn't* so. The first of these divisions is what we expect to find in the standard treatises that are written by eminent men, and in the articles that appear in high-class scientific periodicals. It is true that we are sometimes disappointed in this expectation, for occasionally we find some of the science that *isn't* so, even where we should expect it least. The kind that isn't so is far easier to write; and as the other kind can be produced only by great labor, it is not strange to find our most trusted authorities occasionally going astray, and giving us a few paragraphs of foolishness now and then.

Beautiful examples of the kind of science that *isn't* so can be found in the newspapers, and in a good many of the so-called "popular" books. Such books are written, for the most part, by men who have an idea that that mythical individual, "the average man," cannot understand the real facts of nature, and they appear to think it necessary to tone down those facts and smooth them off and fix them up and elucidate them by "popularized" illustrations that are more or less inaccurate, until their books, when they are completed, contain much of the second kind of science; that is, much of the science that *isn't* so. All of which is reprehensible in the extreme. It is also alto-

and he always used the dolomitic varieties in his own work.

AN EXTRAORDINARY exhibition took place a few days ago in Philadelphia, where the stockholders of the Keely Motor Company held a meeting, swallowed without a murmur the largest and most highly-flavored doses of impudence, to call it by no worse name, that have ever been offered to that long-suffering corporation, and finally adjourned, after voting to raise more money to go on with the "investigations" for which they have already contributed so much. If we recollect rightly, the last important stockholders' meeting was made joyful by the announcement that within a few weeks a locomotive, propelled by "sympathetic vibrations," would be running regularly on one of the Pennsylvania railroads, and that other machinery, employing the same motive power, would be put in operation as fast as it could be put together. Years have elapsed since then, but no sympathetic locomotive has ever yet moved on a railroad in Pennsylvania or elsewhere, nor has the vibratory force been utilized for any service which has brought income to the corporation; yet, instead of an apology for this trifling, the official communication from the great inventor to the stockholders who have maintained him so long in luxury for so many years is said to have contained the announcement that as the company "had not for years furnished him any money to carry on his experiments," he had resumed "the exclusive ownership of his inventions," and had "been obliged" to form a new association with these inventions as its basis, and "to issue and sell certificates of stock in the new company" in order to raise the money he wanted.

This astounding message to the official meeting of a corporation whose stockholders have expended two hundred and fifty thousand dollars on their great principal's patents and "experiments," seems to have attracted the attention of no one except the retiring President, who mildly remarked that he hoped that in all these new transactions "the interests of the present shareholders would be guarded," but did not mention how he would propose to guard them from a person who had, according to his own statement, appropriated all the interests they had, and sold them to some one else. A much greater sensation was excited when Mr. Keely's counsel read the other portion of the report, in which it was announced that after reaching the point of promising to drag locomotives around by sympathetic vibrations, and actually showing a coffee-mill at work, attached to a "vaporic generator," he was "baffled by a mechanical difficulty that was impossible for him to overcome," and had since then devoted his attention to the construction of a "sympathetic liberator," which will transmit an "uplifting expansive force" of twenty-five thousand pounds per square inch through a wire, and now occupies all his attention. In his own opinion the success of this "new departure" would be greater than the most sanguine of his adherents had anticipated, but, although he was expecting to receive in a few weeks some machinery which would go far toward perfecting his discovery, he "would not venture to predict how soon his work would be concluded." As a confirmation of this interesting statement, his counsel read a supplementary report, drawn up by himself at Mr. Keely's request, in which he expressed the opinion that the great inventor "had reached the sphere of perfect vibratory sympathy." This cheered the stockholders to such a degree that they immediately raised the appropriation for expenses, without waiting to inquire whether it was they or the shareholders of the other company that the great man proposed to be in "vibratory sympathy" with for the future, and then adjourned, to wait with patience for the appearance of the "sympathetic liberator" in the mechanical world.

from foreign parts to render a definite service is clearly forbidden, and, unless the plea can be made that the cure of souls on Mr. Warren's plan is a new and useful industry, we do not see how the Trinity parish can escape a heavy fine. A still more interesting phase of the matter is, however, to be found in the glimpse which it gives us of the possibilities of the future unless the statute law is soon repealed or modified. As the law now stands, not only the English clergymen, who are tolerably numerous in this country, but the foreign opera-singers, dancers, actors and actresses, lecturers, pianists and other musicians, professors, teachers and artists, who come by invitation and promise of reward to instruct and delight us, are here in defiance of the laws of the United States, and must, according to those laws, be shipped back at once to their native country by the United States marshal, if he can catch them, while those persons who invited them to come here are subject to severe punishment. There is no difference between the cases of these persons and the Canadian ship-carpenters who were made to experience the rigor of the statute a year or two ago. Our native songsters and divines have just as much a right to protection against foreign competition as the Detroit boat-builders or the New England weavers, and the arrest and expulsion from the country of Colonel Mapleson's opera troupe, for example, with the exile to the Dry Tortugas of a few impresarios and church committees, would teach the bloated aristocrats of the country a lesson in regard to the claims of native and naturalized talent, which seems as yet to have been thoroughly learned only by the working-classes.

A CANVASS is being made of the colored population of the country for the purpose of raising funds for the erection of a monument to commemorate the part which the African race took in our Civil War. While it would be unfortunate to distinguish in general by the accident of ancestry among the patriotic citizens who took up arms in defence of what they

Bennett C. Wilson filed his bill in the court below against John W. Keely, claiming to be the assignee of said Keely of a certain principle or machine known (by Keely) as a reacting vibrating machine, "being an independent motor or self-acting, having a revolving globe and other appliances, the said globe being the centre for the dispensation of said motor and power, and where all the actual power is produced, dependent only on itself for this production and reaction unlimited." The bill avers that since said assignment the defendant has received divers large sums of money from the exhibition of, and sale of interests in, and from the unlawful use of, said invention, and prays discovery relative thereto; that the defendant has neglected and refused to permit complainant "to have access to and examine the drawings, models, and machines embodying the invention referred to in the assignment hereinbefore named in the possession and under the control of said defendant;" that complainant believes that the defendant, unless restrained by an order of this court, will sell and assign said invention to others, and dismantle and alter said motor. The prayers for relief, briefly stated, are, that the defendant be enjoined from removing the machines or models known as the Keely Motor, from the shops where the same are now located; from selling, assigning, or using the same; and particularly that the defendant be compelled to forthwith "exhibit to your orator, and permit him to inspect all models, machines, drawings, and descriptions in the possession of the defendant, of the invention referred to in the above named assignments, and known as the Keely Motor."

Upon the filing of the bill the court below granted an ex parte injunction, which was afterwards continued until the further order of the court. A demurrer was filed by the defendant, which appears to have been overruled, with leave to answer over; a commission of experts was appointed to examine the machine, who reported to the court, on October 20, 1888; a rule for an attachment against the defendant was granted, on October 24, 1888, and upon the 25th of the same month the defendant took a rule to dissolve the injunction. I have referred to only a few of the docket entries; they are very numerous, and indicate an especially active and hostile litigation, culminating November 17, 1888, in the commitment

Decrees of Court should stand alone. Strong in their inherent strength, and the unquestioned faith which the profession and the judiciary have accorded to them, their force is weakened by argument or evidence.

It is with great reluctance therefore that we yield to the temptation to appear to verify our decree by evidence.

Had Mr. Keely then made the motion to dissolve the injunction before our order os April 7th?

On pages 7 and 8 of Mr. Keely's paper book we find the following: "He also entered a rule for an inspection of the Keely Motor. The defendant having interposed a demurrer to the bill, and also having entered a rule to dissolve the special injunction, which was supported by numerous affidavits, and argument having been had upon the questions presented, the court, on the 16th day of March, 1888, filed an opinion in the following words, to wit:

On page 10 the decree is set out as follows: "The demurrer is overruled with leave to answer. The order for inspection is allowed; upon the return thereof the motion to dissolve the special injunction will be determined."

In Mr. Wilson's paper book the same facts are set out. It is likewise reported, not only that Mr. Shapley forcibly urged them in argument, but also that they were admitted by Mr. Keely's counsel in open court.

It appears then from the record; from the decree of the court; from the paper books; from the argument of Mr. Shapley; from the admission of Mr. Keely's counsel, and from Justice Mitchell's opinion, that the motion to dissolve was made before the order of inspection of April 7th.

Doubtless the learned Chief Justice was misled by that portion of Mr. Keely's paper book wherein is set out the docket entries of the Prothonotary's clerk. On page 3, under the head of "Docket Entries," there is the following entry: "October 25, 1888. Rule to dissolve injunction against John W. Keely."

It is scarcely necessary to say that the records of causes are the papers filed therein upon which the court has acted, and which set forth the action of the court; and that docket extries are merely short minutes made by the clerks of the Prothonotary to indicate the steps taken, and form no part of the records.

Supreme Court.

Commonwealth ex Relatione John W. Keely vs. Howard Perkins, Superintendent of the Philadelphia County Prison.

Contempt—Commitment for—Jurisdiction—Preliminary injunction—Motion to dissolve—Order of Court against defendant before issue joined not enforceable by attachment.

Upon a bill in equity, by one claiming to be the assignee of the defendant's machine or device, to restrain defendant from assigning or selling the machine, &c., the Court granted a preliminary injunction and subsequently made an order requiring the defendant to exhibit, operate and explain his machine to plaintiff and experts appointed by the Court, for the purposes of the hearing and adjudication of the case. Afterwards the Court committed the defendant for contempt for disobedience of this order.

Held: on *habeas corpus*, that at the time of said order no answer was filed, and the order having been made in advance of issue joined, was improvident, and could not be enforced by attachment.

Semble: that a committal for contempt should set forth the nature of the contempt and such facts as show jurisdiction.

MITCHELL, J., concurs, on the ground that the record does not show a motion to dissolve the injunction pending at the time of the order complained of.

Charles B. Collier, J. Jos. Murphy and *Wayne MacVeagh, Esqs.*, for Keely, the appellant.

Messrs. Strawbridge & Taylor, and *A. S. L. Shieds* and *Rufus E. Shapley, Esqs.*, for appellee.

January 28, 1889. Opinion by PAXSON, C. J.

This was a writ of Habeas Corpus. The relator complains that he is unlawfully restrained of his liberty by the Keeper of the Philadelphia County Prison. The respondent makes return that he holds the relator by virtue of the following commitment:

"Be it remembered that on 17th day of

Amendment XIV., constitution of the United States; Fetter v. Wilt, 46 Pa. 457; Murray v. Improvement Co., 18 How. 272, 280; Walker v. Sauvinet, 92 U. S. 90, 93; Hagar v. Reclamation District, 111 U. S. 701, 708; Westervelt v. Gregg, 12 N. Y. 209 (62 Amer. D. 160).

2. It is a practice as old as courts of equity themselves, that before proofs are taken an answer shall be filed and regular issues of fact established. It is the rule at law, also, that no proofs can be taken before the case is at issue. Under Equity Rule, § 37, the only occasion where the right to answer may not be insisted on, is where the court is of the opinion that the demurrer was put in for delay. And even on bills of discovery, before discovery can be had, or an order for the production of documents made, an answer is always filed. Inspection is never allowed until after answer, for until then it is not known whether there is a right of inspection. The court makes interlocutory orders for the production of documents only upon two principles, security pending litigation and discovery for the purposes of the suit: Lingen v. Simpson, 6 Mad. 290; Lady Breresford v. Driver, 14 Beav. 387; Werne v. Berners, 1 Phila. 482; Perry v. Kinley, 1 Phila. 505; Wigram on Discovery, 21, 22; Story, Eq. J., § 1490, n. 3. Moreover, the court required the construction and explanation of the machine, before the plaintiff had shown what it was or in any way described it. The plaintiff must establish his right to the subject matter of the suit, before he is entitled to discovery: Portuondo v. Faunce, 9 W. N. 539; Iowa v. Start, 7 Ia. 501; Public Works v. Columbia College, 17 Wal. 530; Ex parte Hardy, 68 Ala. 335.

II. The commitment was illegal, because the offence, if at all punishable, was not punishable with imprisonment.

1. There is no power in our courts to commit for contempt, other than that authorized by § 23, act of June 16, 1836, P. L. 793; Commonwealth v. Roberts, 2 Clark 340, 345. No implication and no fancied necessity can be permitted to add to the literal meaning of the words by which the legislature has restricted this power: Rutherford v. Holmes, 5 Hun 317, 319. Under the statute recited, the only contempts punishable with imprisonment are those committed in open court.

III. The commitment was illegal, because there was in fact no disobedience of the court's order.

tion and operation, although it clearly appeared that it would require considerable expense to clean the machine, put it together and operate it. The defendant appears to have been willing to exhibit it, and in point of fact did so. In view of this, I have not considered it necessary to review the authorities upon the question of the power of the court to compel him to exhibit his machine before issue joined. That he might have been compelled to do so at a proper stage of the cause is conceded. But to make an order not only to exhibit, but to operate it, the practical effect of which was to wring from him his defence in advance of any issue joined, was an excessive and improvident exercise of chancery powers. It is the more remarkarble from the fact that the plaintiff's case, as shown by the exhibits and drawings, was sealed up in an envelope and retained by the court, access to the same being not only denied to the defendant, but even to the experts appointed by the court.

It is not necessary to discuss the question, how far the motion to dissolve the injunction justified the proceedings. Upon that motion the defendant was the actor, and if his affidavits failed to satisfy the court that the injunction should be dissolved, his motion would necessarily fail. Aside from this, the motion to dissolve was made more than three months after the order of April 7th, as appears by the docket entries.

We are of opinion that the order referred to was improvidently made. It follows that the learned court had no power to enforce it by attachment.

The relator is discharged.

Concurring opinion by MITCHELL, J.

It was stated without challenge at the argument that the relator had made a motion to dissolve the injunction before the order of April 7th, 1888, and the concluding sentence of the opinion of the learned President of the Court below indicates that such was the fact, and that the order was made with special reference to a hearing on that motion.

If that fact were before us, I should be of opinion that the inspection directed by the order was within the regular powers of a Court of equity, especially where it was concurred in by the relator himself for several months, nominally complied with, and not objected to until he found it was to be a real examination, which was to bring his discovery to a genuine test before a competent mechanical tribunal.

But the record, unfortunately, does not show any application to dissolve the injunction until October 25th, several months after the order for inspection; and as, on a hearing of this kind, we can review only the regularity of the proceedings upon their face, we are bound by the dates as they appear on the record.

Upon this ground, I concur in the opinion of the Court that the order for inspection was premature, and the commitment for contempt in not obeying it was therefore improvidently issued.

Keely vs. Wilson.

January 28, 1889. Opinion by PAXSON, C. J.

For the reasons given in Commonwealth *ex relatione* John W. Keely *vs.* The Superintendent of the Philadelphia County Prison, *ante*, the order of the Court below, of date of November 17th, 1888, committing the said John W. Keely to the county prison for contempt, is reversed and set aside.—*Legal Intelligencer.*

of a court of equity, especially where it was concurred in by the relator himself for several months, nominally complied with, and not objected to until he found it was to be a real examination which was to bring his discovery to a genuine test before a competent mechanical tribunal.

But the record unfortunately does not show any application to dissolve the injunction until October 25th, several months after the order for inspection; and, as on a hearing of this kind, we can review only the regularity of the proceedings upon their face, we are bound by the dates as they appear on the record.

Upon this ground I concur in the opinion of the court that the order for inspection was premature, and the commitment for contempt in not obeying it was therefore improvidently issued.

WRIT OF CERTIORARI.

OPINION, MR. CHIEF JUSTICE PAXSON:

For the reasons given in Commonwealth ex relatione John W. Keely v. The Superintendent of the Philadelphia County Prison, just decided, the order of the court below of date of November 17, 1888, committing the said John W. Keely to the county prison, for contempt, is reversed and set aside.

PHILADELPHIA CITY v. S. H. DUNGAN.
PHILADELPHIA CITY v. E. O. MICHENER.

ERROR TO THE COURT OF COMMON PLEAS NO. 3 OF PHILADELPHIA COUNTY.

Argued January 14, 1889—Decided January 28, 1889.

1. A writ of error, not an appeal, is the proper remedy against an erroneous order striking a municipal claim for lien from the records, and an appeal improvidently taken from such order will be quashed on motion.
2. The object of the Philadelphia registry acts: March 14, 1865, P. L. 321; March 29, 1867, P. L. 600, is *(a)* to enable the city to designate the true

second, the defendant's "whole right and title with all interest in said invention." The bill averred further that in 1872, the defendant told plaintiff that the invention or machine had proved a failure and he had wholly abandoned it, which assurance the defendant had repeated in frequent interviews between 1872 and 1887; that in April, 1887, the plaintiff accidentally saw in the defendant's work-shop the machine now known as the Keely Motor, which he at once recognized as the machine, or an improvement on it, which he had purchased in 1869, and which he had been led to believe by the defendant had been abandoned as worthless; that, since the said assignments to the plaintiff, the defendant had received large sums of money from the exhibition of, and from sales of interests in, said machine, which he had refused to account for. The bill prayed, inter alia:

1. That the defendant be enjoined "from removing the machines or models known as the Keely Motor, and referred to in the assignments hereinbefore named, from the shops or places where the same are now located, and from changing, altering, adding to, taking from, or otherwise varying the construction or mode of operation of the same."

2. That the defendant be enjoined "from selling, assigning or encumbering in any manner the above-named inventions, or either of them."

3. That the defendant be enjoined from making, using or vending "the above-named inventions, or either of them."

4. That the defendant be compelled forthwith "to exhibit to your orator, and permit him to inspect all models, machines, drawings and descriptions in the possession of the defendant, of the invention referred to in the above-named assignments, and known as the Keely Motor, and of all inventions made by the said defendant subsequent to the fourteenth day of August, 1869, upon said original invention or pertaining thereto, and of all improvements thereon, and that said defendant be compelled, by an order of this court, to explain and fully disclose to your orator all of said inventions and the mode of constructing and operating the same."

On the day of filing the bill, a special injunction was awarded, issued, and on the next day served. On January 5, 1888, hereby ordered by the Court that the defendant, the said John W. Keely, shall within thirty days exhibit to the said plaintiff, his attorneys, and to Charles M. Cresson, Thomas Shaw, Esq., Prof. Wm. D. Marks, and Jacob Naylor, Esq., who are hereby appointed by the Court as experts, the inventions, machines, or devices referred to in the plaintiff's bill and now known as the 'Keely Motor,' and shall then and there in their presence operate the same or cause them to be operated and explain the mode of constructing and operating them. And the said experts are hereby authorized and directed to make such an examination of said machines as will enable them to inform the Court as to their identity in construction, principle, or operation with the invention described in the complainant's bill as having been assigned him in the year 1869 by the respondent, the said complainant giving the said experts such a particular description of the last mentioned invention as may be necessary to enable the comparison to be made; and the said experts shall further make such drawings of the machine known as the "Keely Motor" as they may consider necessary for the information of the Court and report jointly or severally; and it is further ordered that the information obtained by this inspection by the complainant and his counsel or by the said experts shall not be used for any other purpose than for the proper hearing and adjudication of the present proceeding."

The experts appointed as above made two successive reports on September 18, 1888, and October 20, 1888, stating that they had visited the workshops of the defendant on May 7, 1888, and had had the motor exhibited to them in a dismantled condition. That the defendant had stated to them that it would require considerable expense to clean the machine, put it together, and operate it, but that the same could be performed in three weeks from that date. That thereafter on May 31, 1888, and afterwards on June 9, 1888, the said experts had again been present at said workshop but that no progress had been made in the cleaning and setting together of the machine, and that they were then and there informed by counsel for the defendant that no further attempts would be made to clean and exhibit the machine unless the necessary funds were provided for the purpose. The experts further reported that from the explanations given by defendant, and the drawings furnished by him, they were wholly unable to understand the nature and operation of the machine. They further reported as follows:—

"That in the opinion of the experts whose names are hereto attached, it will be impossible to explain the construction of the Keely Motor, or of the apparatus which has been exhibited in a dismantled condition, and also by photographs and drawings (which photographs and drawings represented only the globe and generator), unless the experts are given an intelligent explanation of the mode of operation of said apparatus, and that it is further the opinion of the experts that in order to determine that the machine is a motor, it is necessary that the said apparatus be operated in their presence, in order that the mode or principle of operation may be understood."

It also appeared from said report that the complainant had placed in a sealed envelope certain memoranda and rough drawings relative to the invention assigned to him, and had handed the same to Dr. Cresson, one of the experts, but that the same had not been opened and communicated to the other experts. On October 24, 1888, a rule was entered on motion of the complainant for an attachment against defendant for contempt of Court in failing to comply with the order of April 7, 1888. On October 25, 1888, defendant moved to have complainant's sealed statement opened and submitted to counsel, and also moved to dissolve the injunction. On November 10, 1888, the rule for an attachment was made absolute, the rule to dissolve the injunction was discharged, and the injunction was continued until further order. On the same day, the rule to have the complainant's sealed statement opened was discharged and the sealed envelope was taken possession of by the Court. On November 17, 1888, a decree was made, adjudging Keely guilty of contempt. On the same day an attachment was issued against him, and, after hearing, the following decree was entered:—

"And now, November 17, 1888, the said respondent, John W. Keely, having been brought into Court by the attachment issued in these proceedings, and having been required by the Court to purge himself of the contempt of which he is convict, or show cause why he should not be further dealt with as to the Court may appear proper; and the said John W. Keely not having purged himself of said contempt, and not having shown cause why he should not be further dealt with, after hearing the said John W. Keely, and upon full consideration, it is decreed and adjudged that for the said contempt the said John W. Keely shall be committed to the county prison, to be there kept and confined in custody until he shall have purged himself of said contempt, and until he shall have been legally discharged from said contempt."

The defendant having been committed to the county prison in pursuance of the above decree, the present writ of habeas corpus was issued, to which the keeper of the Philadelphia County Prison made return as set forth in the opinion of the Supreme Court. The record of the case was wealth ex rel. Torrey v. Ketner, 92 Pa. 372. See also Hummell and Bishoff, 9 W. 416; Commonwealth v. Newton, 1 Gr. 453.

We might well discharge the relator upon the insufficiency of the commitment. It is not only vague, but it wholly fails to show the nature of the contempt for which he was committed. As we do not review such cases upon the merits, and only inquire into them so far as to ascertain whether the court had the jurisdiction or power to make the order, it is manifest that in many instances the parties would be remediless unless the commitment sets forth such facts as show jurisdiction. We are not asked, however, to decide this case upon technical grounds.

A certiorari having been issued to the court below, we have before us the record of the case of Wilson v. Keely, and from it we learn that the alleged contempt consisted in a refusal to obey an interlocutory order. If the court had the power to make the order, we have no doubt it possessed the power to enforce it by attachment, and, if necessary, by imprisonment. It is true, under the act of June 16, 1836, the punishment of imprisonment for contempt is limited to such contempts as shall be committed in open court. It is also true that obedience to the lawful process of the court may be enforced by attachment. Imprisonment for contempt committed in open court is imposed as a punishment, and is for a definite period. Imprisonment for disobedience to the process of the court is not so much for a punishment as to enforce such process, and ceases the moment the party purges himself of his contempt by obedience. The power in both instances is essential to the existence of the court. A court that has not the power to protect itself from public insult, or to compel obedience to its lawful process, would be beneath contempt. As to the authority of the court to enforce obedience to its process by attachment, I refer to Tome's App., 50 Pa. 285; Commonwealth v. Reed, 59 Pa. 425, in which the subject is fully discussed.

If the court below had jurisdiction of the parties and the subject matter, and the order in question was lawfully made, it possessed the power to enforce it by attachment. It is almost needless to say that the converse of this proposition is equally true. This involves a brief examination of the nature of the proceedings.

said discovery, and the apparatus in which it has from time to time been embodied, has not the remotest similitude to or connection with the invention referred to in complainant's bill or the assignments thereto annexed, and that the same was not the outgrowth of any experiments made by the deponent at any time during his association with the defendant, and that the complainant never contributed a dollar directly or indirectly connected therewith.

This is a full and complete denial of the plaintiff's claim, and might be conclusive. The effect, however, which should be given to evidence, may depend upon not only what is averred, but also upon what is unsaid. The defendant has in no way stated what the principle and machine were which he assigned to plaintiff. He is the only one who could give any information upon this subject and enable us to judge correctly between the contradictory statements of the parties. This information would either corroborate him or corroborate the plaintiff. He has withheld it, and he may not complain if we are compelled thereby to draw inferences unfavorable to his assertions.

In this case we find it impossible to determine from the affidavits and arguments of counsel what the principle and machine assigned to plaintiff may be, in construction, operation, or results. We know a little more of the Keely Motor, in this respect, but even that is vague and indefinite. The examination is therefore necessary for an intelligent consideration of the rights of the parties. It may also determine this proceeding; and can be made without injury to the rights of any one interested. We regret that the zeal of counsel has induced reflections upon Mr. Keely, not warranted by the evidence, and not necessary for a proper presentation of their case.

The demurrer is overruled with leave to answer. The order for inspection is allowed; upon the return thereof, the motion to dissolve the special injunction will be determined.

Thereupon, on April 7, 1888, the order for inspection, appointing Charles M. Cresson, Thomas Shaw, Wm. D. Marks and Jacob Naylor, as experts, fully appearing in the opinion of this court, was made.

On May 5, 1888, the Keely Motor Company presented a

November, 1888, on motion of ———, Esquire, the Court ordered, and now the said John W. Keely having been brought into Court by the attachment issued in these proceedings, and having been required by the Court to purge himself of the contempt of which he is convict, or show cause why he should not be further dealt with as to the Court may appear proper, and the said John W. Keely not having purged himself of said contempt, and not having shown cause why he should not be further dealt with. After hearing the said John W. Keely, and after full consideration, it is decreed and adjudged that for the said contempt the said John W. Keely shall be committed to the county prison, to be there kept and confined untill he shall have purged himself of said contempt, and until he shall have been legally discharged from custody."

Upon the presentation of the petition with a copy of said commitment to Justice Sterrett, in vacation, he allowed the writ returnable before him at Chambers. Upon the return of the writ the hearing was continued to the 12th of January, before the Court in banc, and the relator was admitted to bail in the meantime. This was the course pursued in Commonwealth *ex rel.* Torrey *vs.* Retner, 92 Pa., 372. See also Hammel *vs.* Bishop, 9 W., 416, and Commonwealth *vs.* Newton, 1 Grant, 453.

We might well discharge the relator upon the insufficiency of the commitment. It is not only vague, but it wholly fails to show the nature of the contempt for which he was committed. As we do not review such cases upon the merits, and only inquire into them so far as to ascertain whether the Court had the jurisdiction or power to make the order, it is manifest that in many instances the part would be remediless unless the commitment sets forth such facts as show jurisdiction. We are not asked, however, to decide the case upon technical grounds.

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If the Court below had jurisdiction of the parties and the subject matter, and the order in question was lawfully made, it possessed the power to enforce it by attachment. It is almost needless to say that the converse of this proposition is equally true. This involves a brief examination of the nature of the proceedings.

Bennett C. Wilson filed his bill in the court below against John W. Keely, claiming to be the assignee of said Keely of a certain principle or machine known (by Keely) as a reacting vibrating machine, being an independent motor or self-acting, having a revolving globe and other appliances, the said globe being the centre for the dispensation of said motion and power, and when all the actual power is produced, dependent only on itself for this production and reaction unlimited. The bill avers that since said assignment the defendant has received divers large sums of money from the exhibition of, and sale of interests in, and from the unlawful use of said invention, and prays discovery relative thereto; that the de-

3. In deciding as matter of fact that the defendant disobeyed its order.

4. In deciding, either as matter of fact or of law, that the defendant was guilty of contempt of court.

5. In committing the defendant to prison for alleged contempt.

Mr. Wayne MacVeagh (with him *Mr. Chas. B. Collier* and *Mr. J. Joseph Murphy*), for the petitioner:

This case is brought before this court by habeas corpus and certiorari, in accordance with the practice indicated and established in Hummell and Bishoff, 9 W. 416, and in Commonwealth v. Newton, 1 Gr. 453, wherein it was held that this court possesses a superintending jurisdiction over the proceedings of Courts of Common Pleas to punish for contempt, to see that they have not overstepped their jurisdiction and exercised their summary power in a case not warranted by the laws.

I. The commitment was illegal, because made for alleged disobedience of an extra-jurisdictional and void order of the court.

1. The power to punish contempts, without the intervention of a jury, is inherent in every court, and extends to the enforcement of every order which, in the legitimate exercise of its authority it may make; but it does not extend to orders made without authority or jurisdiction: Ex parte Grace, 12 Ia. 208; Brown v. Moore, 61 Cal. 432; People v. Brennan, 45 Barb. 344, 347. Upon the mere prayer of the plaintiff embodied in his bill, the court proceeded to order what amounted to the presentation of evidence on the part of the plaintiff. The defendant was practically called as a witness for the plaintiff, being required to exhibit and explain the machine which is the subject of the suit, disclosing his case out of court, not under oath or before any person authorized to take testimony, and before he had an opportunity of stating it by the filing of an answer. Such a proceeding is extra-jurisdictional, and therefore illegal; opposed to the recognized course of legal procedure, and is not "due process of law;" culminating as it did in the imprisonment of the defendant, it contravenes the constitutional inhibitions for the protection of the liberty of the citizen: Section 9, article I., constitution of Pennsylvania;

plaintiff, an order upon the defendant, before any issue joined, not only to exhibit his machine but to operate it and explain the method of its construction, is improvident and unenforceable by attachment.

Before PAXSON, C. J., STERRETT, GREEN, CLARK, WILLIAMS, McCOLLUM and MITCHELL, JJ.

No. 114 January Term 1889, Sup. Ct.; court below, No. 372 September Term 1887, C. P. No. 3.

On November 20, 1888, in vacation, John W. Keely presented before Mr. Justice STERRETT his petition, setting forth in outline certain proceedings upon a bill in equity to the number and term above stated in the Court of Common Pleas No. 3 of Philadelphia county, resulting in the issuance of a warrant for the arrest and commitment of the petitioner, under which he was then held and illegally restrained of his liberty by Howard Perkins, superintendent of the county prison; praying that a writ of habeas corpus might be issued, etc. The writ having been awarded as prayed for, returnable forthwith at chambers, the respondent made return as shown in the opinion of this court, before PAXSON, STERRETT and WILLIAMS, JJ., when the hearing was continued to January 12, 1889, before the court in banc, and the relator admitted to bail.

A writ of certiorari to the court below was then sued out by the relator, on the return whereof the following facts appeared:

On January 3, 1888, Bennett C. Wilson filed a bill in equity against John W. Keely, wherein it was averred that by two instruments of writing dated August 14, and August 31, 1869, respectively, the defendant had formally sold and assigned to the plaintiff a certain principle, invention and machine, described by the defendant as "a certain machine known to myself as the Reacting Vibratory Motor, said machine being independent of any outside appliances to produce the power and motion, viz.: a revolving globe with the necessary connections and appliances, said globe being the centre for the dispensation of said motion and power, and where all the actual power is produced, dependent only on itself for this production and reaction (unlimited);"—the first of said instruments granting and assigning to the plaintiff one full half-ownership of said principle and machine, and all improvements that might thereafter be made on the same, and the

Certiorari.

John McGahren, for plaintiff.

P. H. Campbell, for defendant in error.

June 11, 1888. Opinion by RICE, P. J.

There are no irregularities on the face of this record sufficient to warrant a reversal of the judgment on *certiorari* sued out after the expiration of twenty days. The transcript shows that on January 11, 1888, both parties appeared, and, after hearing, the justice held the case under advisement until January 14, 1888, at nine o'clock, A. M., at which time he entered judgment for the plaintiff. The defendant testifies that the justice did not adjourn the case to any definite time, but that, after the conclusion of the hearing, he promised her and her counsel to notify the latter of his conclusion in the matter, which he failed to do. There are exceptional cases in which, to prevent injustice, the Court will receive parol testimony in contradiction of the record. One of these is where the justice makes up a false record; but where this is alleged the evidence should be such as to leave no reasonable doubt of the fact. Here the justice testifies, in support of the record and in direct contradiction of the defendant, that after the trial, in the presence of the attorneys and parties, he gave notice that he would hold the case under advisement until January 14. He also denies that he promised to give notice as alleged by the defendant.

We therefore, have on the one side the uncorroborated oath of an interested party, and on the other a record, presumed. *prima facie*, to have been made up correctly, and the oath of the magistrate, presumed to be impartial and disinterested, in support of it. The Court would not be justified in overturning the judgment where the allegation of misconduct on the part of the justice is so seriously in doubt. It is our plain duty to decide the case upon the record as it stands, and to leave the party alleging misconduct to pursue the ordinary legal remedy.

The exceptions are overruled, and the judgment affirmed.

—4 Kulp. Rep.

Common Pleas--Equity.

C. P. No. 3, OF PHILADELPHIA CO.

In the matter of the Commitment of John W. Keely.

Equity — Records — Docket entries not records—Decrees—Evidence that suit properly brought—Completion of record by Court.

The Court will complete its record without the application of the parties, They have the right to ask the action of the Court in this respect.

Decrees of Court are evidence conclusive that the subject of the decrees have been properly brought before the Court.

Records are the papers filed upon which the Court has acted, and which set forth the action of the Court.

Docket entries are the minutes of the Prothonotary, and form no part of the records.

At the opening of the court on Saturday, February 2d, Mr. Shields said he desired to make a motion to complete the record in the case Wilson *vs.* Keely.

Judge Finletter: We have considered this matter, and yesterday filed an opinion expressive of our views, without the application of the parties. They however, have the right to make such suggestions for our consideration as they think proper. We will, therefore, entertain the motion.

Mr. Shields: I ask leave to file of record this letter from defendant's counsel to us as fixing the date of the motion to dissolve the special injunction which was made by defendant. The letter is as follows:

Bennet Wilson *vs.* John W. Keely.

C. P. 3. S. 87. No. 372. In Equity.

Gentlemen: Please take notice that the defendant herein will on Saturday next, January 21st inst., at 10 o'clock a. m., or as soon thereafter as counsel can be heard in the Court of Common Pleas No. 3 for the City and County of Philadelphia, move the said Court for an order to dissolve the preliminary injunction heretofore granted in said cause.

J. JOS. MURPHY,
CHAS. B. COLLIER,
For defendant.
Jan 18, 1888.

fendant has neglected and refused to permit complainant "to have access to and examine the drawings, models and machines embodying the invention referred to in the arrangement hereinbefore named in the possession and under the control of said defendant;" that complainant believes that the defendant, unless restrained by an order of this court, will sell and assign said invention to others, and dismantle and alter said motor. The prayers for relief, briefly stated, are, that the defendant be enjoined from removing the machines or models known as the "Keely Motor" from the shops where the same are now located, from selling, assigning or using the same, and particularly that the defendant be compelled to forwith "exhibit to your orator and permit him to inspect all models, machines, drawings and desciptions in the possession of the defendant, of the invention referred to in the above named assignment, and known as the Keely Motor."

Upon the filing of the bill, the Court below granted an *ex parte* injunction, which was afterwards continued until the further order of the Court. A demurrer was filed by the defendant, which appears to have been overruled, with leave to answer over; a commission of experts was appointed to examine the machine [See 5 LANCASTER LAW REVIEW 167], who reported to the Court on October 20th, 1888. A rule for an attachment against the defendant on October 24, 1888, and upon the 25th of the same month the defendant took a rule to dissolve the injunction. I have referred to only a few of the docket entries; they are very numerous, and indicate an especially active, hostile litigation, culminating, November 17, 1888, in the commitment of the defendant to the county prison for contempt. The said commitment was based upon disobedience to the order of Court of April 7, 1888. The order was as follows:

"And now, April 7, 1888, in accordance with the opinion heretofore filed in this case, it is hereby ordered by the Court that the defendant, the said John W. Keely, shall, within thirty days, exhibit to the said plaintiff, his attorneys, and to Charles Cresson, Thomas Shaw, Prof. William D. Marks, and Jacob Naylor, Esq., who are hereby appointed by the Court as experts, the inventions, machines or devices referred to in the plaintiff's bill, and now known as the 'Keely Motor,' and shall then and there, in their presence, operate the same, or cause them to be operated, and explain the modes of constructing and operating to them. And the said experts are hereby authorized and directed to make such an examination of said machines as will enable them to inform the Court as to their identity in construction, principle or operation, with the invention discribed in the complainant's bill as having been assigned him in 1869 by the respondent, the said complainant giving the said experts such a particular description of the last mentioned invention as may be necessary to enable the comparison to be made; and the said experts shall further make such drawings of the machine known as the "Keely Motor" as they may consider necessary for the information of the Court, and report jointly or severally; and it is further ordered that the information obtained by this inspection by the complainant and his counsel, or by the said experts, shall not be used for any other purpose than for the proper hearing and adjudication of the present proceeding."

At the time this order was made the cause was not at issue. No answer had been filed, and of course there was no examiner or master. At this stage no legal testimony could have been taken. The plaintiff had obtained his special injunction, which was duly continued within the five days. There was then no further step which the plaintiff could properly take except to put the case at issue. After issue joined, an examiner could have been appointed, and the proofs taken in an orderly manner. Instead of so proceeding, a commission of experts was appointed to examine the defendant's machine, and the order of April 7th was made, by which the defendant, in advance of any issue, was not only required to exhibit his machine, but also to operate it and explain the mode of its construcremoved to the Supreme Court by writ of certiorari, the defendant filing the following assignments of error:—

(1) The Court below erred in ordering the defendant to exhibit and explain an invention to persons having no relation to the action nor to the orderly administration of justice in the case, *the title to which invention was in suit.*

(2) The Court below erred in making any such order before answer filed, or any issue in fact was joined between the complainant and the defendant.

(3) The Court below erred in deciding, as matter of fact, that the defendant disobeyed its order.

(4) The Court below erred in deciding, either as matter of fact or of law, that the defendant was guilty of contempt of Court.

(5) The Court below erred in committing the defendant to prison for alleged contempt.

Wayne MacVeagh (*J. Joseph Murphy* and *Charles B. Collier* with him), for appellant.

The commitment was illegal because made for alleged disobedience of an extra jurisdictional and void order of the Court. No Court has power to commit for disobedience to a void order.

Brown *v.* Moore, 61 Cal. 432.
People *v.* Brennan, 45 Barbour, 344.
Holman *v.* Mayor of Austin, 34 Texas, 668.
Ex parte Grace, 12 Iowa, 208.

The proceeding in this case was not according to due process of law.

Fetter *v.* Wilk, 46 Pa. St. 457.
Murray's Lessee *v.* Hoboken L. & I. Co., 18 Howard, 272.
Walker *v.* Sauvinet, 92 U. S. 90.
Hager *v.* Reclamation Dist., 111 U. S. 701.
Westervelt *v.* Gregg, 12 N. Y. 209.

Discovery, or the equivalent thereof, can never be granted until answer filed and the right to discovery is established.

Werne *v.* Berners, 1 Phila. 482.
Perry *v.* Kinley, Id. 505.
Lingen *v.* Simpson, 6 Mad. 290.
Lady Beresford *v.* Driver, 14 Beav. 387.
Public Works *v.* Columbia College, 17 Wall. 530.
Portuondo *v.* Faunce, 9 Weekly Notes, 539.
Wigram on Discovery, pp. 21, 22.
Story Eq. Juris., § 1490, note 3.
State *v.* Start, 7 Iowa, 501.
Ex parte Hardy, 68 Ala. 303.

There is no power to commit for contempt except under the Act of June 16, 1836.

Com'th *v.* Roberts, 2 Clark, 340.
Rutherford *v.* Holmes, 5 Hun, 317.

The defendant in fact was not guilty of any disobedience to the order of the Court.

Rufus E. Shapley (*William C. Strawbridge*, *J. Bonsall Taylor*, and *Albert S. L. Shields* with him), for appellee.

The proceedings were regular, and the order for inspection lawful.

Flight *v.* Robinson, 8 Beavan, 22.
Stainton *v.* Chadwick, 3 McN. & G. 582.
Reade *v.* Woodrooffe, 24 Beavan, 424.
Earl of Lonsdale *v.* Curwen, 3 Bligh. 168.
Kynaston *v.* East India Co., 3 Swan. 261.
Barlow *v.* Bailey, 18 Weekly Rep. 783.
Singer Manf. Co. *v.* Wilson, 13 Id. 560.
Morgan *v.* Séward *et al.*, 1 Web. 169.
Electric Tel. Co. *v.* Nott, 2 Cooper's Chan. Cases, 41.
Patent Type, etc., Co. *v.* Walter, Johns. 727.

The Court clearly had power to commit for contempt.

Tome's Appeal, 50 Pa. St. 298.
Com'th *v.* Reed, 59 Id. 429.

Whether the defendant was guilty of contempt or not was a matter for the discretion of the lower Court, which this Court will not review.

Com'th *v.* Newton, 1 Grant, 454.
Hummel *v.* Bishoff, 9 Watts, 431.
In re Turnpike Co., 97 Pa. St. 268.

The record clearly shows that Keely was guilty of a contempt.

COMMONWEALTH, EX REL. KEELY, v. SUPERINTENDENT OF COUNTY PRISON.

January 28, 1889. THE COURT. This was a writ of habeas corpus. The relator complains that he is unlawfully restrained of his liberty by the keeper of the Philadelphia County Prison. The respondent makes return that he holds the relator by virtue of the following commitment:—

"Be it remembered, that on the 17th day of November, 1888, on motion of ——— ———, Esquire, the Court ordered: And now the said John W. Keely having been brought into Court, by the attachment issued in these proceedings, and having been required by the Court to purge himself of the contempt of which he is convict, or show cause why he should not be further dealt with as to the Court may appear proper, and the said John W. Keely not having purged himself of said contempt, and not having shown cause why he should not be further dealt with: After hearing the said John W. Keely, and after full consideration, it is decreed and adjudged, that for the said contempt the said John W. Keely shall be committed to the county prison, to be there kept and confined in custody until he shall have purged himself of said contempt, and until he shall have been legally discharged from said custody."

Upon the presentation of the petition, with a copy of said commitment, to Justice STERRETT, in vacation, he allowed the writ, returnable before him at chambers. Upon the return of the writ the hearing was continued to the 12th of January, before the Court in banc, and the relator was admitted to bail in the meantime. This was the course pursued in Commonwealth *ex rel.* Torrey *v.* Ketner (92 Pa. 372). See also Hummel *v.* Bishoff (9 W. 416); Com. *v.* Newton (1 Grant, 453).

We might well discharge the relator upon the insufficiency of the commitment. It is not only case, and Commonwealth v. Reed, 59 Pa. 429, seem to be conclusive upon the question.

4. Is the question of fact to be re-tried by this court upon the record before it? "The object of the removal is not to inquire into the merits of the case, but to ascertain whether the court had jurisdiction and exercised it according to law:" Hummel and Bishoff, 9 W. 431. Proceedings for contempt are not reviewed by this court on their merits: Commonwealth v. Newton, 1 Gr. 454; In re Kensington etc. Turnpike Co., 97 Pa. 268. But did the defendant ever intend to attempt to comply with the order? Let the record answer.

WRIT OF HABEAS CORPUS.

OPINION, MR. CHIEF JUSTICE PAXSON:

This was a writ of habeas corpus. The relator complains that he is unlawfully restrained of his liberty by the keeper of the Philadelphia county prison. The respondent makes return that he holds the relator by virtue of the following commitment:

"Be it remembered, that on the 17th day of November, 1888, on motion of ——— ———, Esquire, the court ordered: And now the said John W. Keely having been brought into court, by the attachment issued in these proceedings, and having been required by the court to purge himself of the contempt of which he is convict, or show cause why he should not be further dealt with as to the court may appear proper, and the said John W. Keely not having purged himself of said contempt, and not having shown cause why he should not be further dealt with: After hearing the said John W. Keely, and after full consideration, it is decreed and adjudged, that for the said contempt the said John W. Keely shall be committed to the county prison, to be there kept and confined in custody until he shall have purged himself of said contempt, and until he shall have been legally discharged from said custody."

Upon the presentation of the petition, with a copy of said commitment, to Justice STERRETT, in vacation, he allowed the writ returnable before him at chambers. Upon the return of the writ the hearing was continued to the 12th of January, before the court in banc, and the relator was admitted to bail in the meantime. This was the course pursued in Common-member of the class can take, depends upon the contingency of his or her arriving at the age of twenty-five years.

Measuring this will by its possibilities, not by the facts as they happened to be, it is easy to see that grandchildren may be born within one year before the death of a life-tenant, in which case the gift could not vest within the period fixed by the rule against perpetuities. We must be careful not to strain the law so as to avoid this rule. It is founded upon a sound principle of public policy and should be rigidly enforced. We are constrained to hold that the gift to the grandchildren is void, and that the estate must be distributed to the children who have the life estates.

This conclusion meets the substantial justice of the case.

The decree is reversed at the costs of the appellees; the adjudication of the auditing judge is affirmed, and it is ordered that distribution be made in accordance therewith.

Mr. Justice STERRETT dissents.

COMMONWEALTH EX REL. v. HOWARD PERKINS.

[BENNETT C. WILSON v. JOHN W. KEELY.]

WRIT OF HABEAS CORPUS, DIRECTED TO THE SUPERINTENDENT OF PHILADELPHIA COUNTY PRISON.

Argued January 12, 1889—Decided January 28, 1889.

1. If the return to a writ of habeas corpus, issued from the Supreme Court, show that the relator is held under a commitment for contempt from a subordinate court which wholly fails to show the nature of the contempt, the relator may be discharged on the ground of the insufficiency of the commitment.
2. Section 23, act of June 16, 1836, P. L. 793, does not deprive a court of equity having jurisdiction of the parties and the subject-matter, of the power, essential to the existence of the court, to enforce obedience to its orders and decrees, lawfully made, by process of attachment and imprisonment.
3. Where there is involved, in proceedings in equity, the identity of an invention or machine held by the defendant with one claimed by the

vague, but it wholly fails to show the nature of the contempt for which he was committed. As we do not review such cases upon the merits, and only inquire into them so far as to ascertain whether the Court has the jurisdiction or power to make the order, it is manifest that in many instances the parties would be remediless unless the commitment sets forth such facts as show jurisdiction. We are not asked, however, to decide this case upon technical grounds.

A certiorari having been issued to the Court below, we have before us the record of the case of Wilson *v.* Keely, and from it we learn that the alleged contempt consisted in a refusal to obey an interlocutory order. If the Court had the power to make the order we have no doubt it possessed the power to enforce it by attachment, and, if necessary, by imprisonment. It is true, by the Act of June 16, 1836, the punishment of imprisonment for contempt is limited to such contempts as shall be committed in open Court. It is also true that obedience to the lawful process of the Court may be enforced by attachment. Imprisonment for contempt committed in open Court is imposed as a punishment, and is for a definite period. Imprisonment for disobedience to the process of the Court is not so much for a punishment as to enforce such process, and ceases the moment the party purges himself of his contempt by obedience. The power in both instances is essential to the existence of the Court. A Court that has not the power to protect itself from public insult, or to compel obedience to its lawful process, would be beneath contempt. As to the authority of the Court to enforce obedience to its process by attachment, I refer to Tome's Appeal (50 Pa. 285); Com. *v.* Reed (59 Id. 425), in which the subject is fully discussed.

If the Court below had jurisdiction of the parties and the subject matter, and the order in question was lawfully made, it possessed the power to enforce it by attachment. It is almost needless to say that the converse of this proposition is equally true. This involves a brief examination of the nature of the proceedings.

Bennett C. Wilson filed his bill in the Court below against John W. Keely, claiming to be the assignee of said Keely of a certain principle or machine known (by Keely) as a reacting vibrating machine, being an independent motor or self-acting, having a revolving globe and other appliances, the said globe being the centre for the dispensation of said motor and power, and where all the actual power is produced, dependent only on itself for this production and reaction unlimited. The bill avers that since said assignment the defendant has received divers large sums of money from the exhibition of, and sale of interests in, and from the unlawful use of, said invention, and prays discovery relative thereto; that the defendant has neglected and refused to permit complainant "to have access to and examine the drawings, models, and machines embodying the invention referred to in the assignment hereinbefore named in the possession and under the control of said defendant;" that complainant believes that the defendant, unless restrained by an order of this Court, will sell and assign said invention to others, and dismantle and alter said motor. The prayers for relief, briefly stated, are, that the defendant be enjoined from removing the machines or models known as the "Keely motor," from the shops where the same are now located; from selling, assigning, or using the same; and particularly that the defendant be compelled to forthwith "exhibit to your orator, and permit him to inspect all models, machines, drawings, and descriptions in the possession of the defendant, of the invention referred to in the above named assignments, and known as the Keely Motor."

Upon the filing of the bill the Court below granted an *ex parte* injunction, which was afterwards continued until the further order of the Court. A demurrer was filed by the defendant, which appears to have been overruled, with leave to answer over; a commission of experts was appointed to examine the machine, who reported to the Court, on October 20, 1888; a rule for an attachment against the defendant, on October 24, 1888, and upon the 25th of the same month the defendant took a rule to dissolve the injunction. I have referred to only a few of the docket entries; they are very numerous, and indicate an especially active and hostile litigation, culminating November 17, 1888, in the commitment of the defendant to the county prison for contempt. The said commitment was based upon disobedience to the order of Court of April 7, 1888. The order was as follows:—

"And now, April 7, 1888, in accordance with the opinion heretofore filed in this case, it is hereby ordered by the Court that the defendant, the said John W. Keely, shall within thirty days exhibit to the said plaintiff, his attorneys, and to Charles M. Cresson, Thomas Shaw, Prof. Wm. D. Marks, and Jacob Naylor, Esq., who are hereby appointed by the Court as experts, the inventions, machines, or devices referred to in the plaintiff's bill, and now known as the 'Keely Motor,' and shall then and there in their presence operate the same or cause them to be operated, and explain the mode of constructing and operating it to them. And the said experts are hereby authorized and directed to make such an examination of said machines as will enable them to inform the Court as to their identity in construction, principle, or operation with the invention described in the complainant's bill as having been assigned him in 1869 by the respondent,

THE

LANCASTER LAW REVIEW,

CONTAINING

REPORTS, MATTERS OF PRACTICE, AND NOTES OF CASES ARGUED
AND DETERMINED IN THE COUNTY COURTS AND SUPREME
COURT OF PENNSYLVANIA, ETC.

BY

GEORGE ROSS ESHLEMAN,

Of the Lancaster Bar.

VOL. VI.

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THE INQUIRER PRINTING AND PUBLISHING COMPANY.
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in advance of any issue, was not only required to exhibit his machine, but also to operate it, and to explain the mode of its construction and operation, although it clearly appeared that it would require considerable expense to clean the machine, put it together, and operate it. The defendant appears to have been willing to exhibit it, and in point of fact did so. In view of this I have not considered it necessary to review the authorities upon the question of the power of the court to compel him to exhibit his machine before issue joined. That he might have been compelled to do so at a proper stage of the cause, is conceded. But to make an order not only to exhibit, but to operate it, the practical effect of which was to wring from him his defence in advance of any issue joined, was an excessive and improvident exercise of chancery powers. It is the more remarkable from the fact that the plaintiff's case, as shown by the exhibits and drawings, was sealed up in an envelope and retained by the court, access to the same being not only denied to the defendant, but even to the experts appointed by the court.

It is not necessary to discuss the question how far the motion to dissolve the injunction justified these proceedings. Upon that motion the defendant was the actor, and if his affidavits failed to satisfy the court that the injunction should be dissolved his motion would necessarily fall. Aside from this the motion to dissolve was made more than three months after the order of April 7th, as appears by the docket entries.

We are of opinion that the order referred to was improvidently made. It follows that the learned court had no power to enforce it by attachment.

The relator is discharged.

CONCURRING OPINION, MR. JUSTICE MITCHELL:

It was stated without challenge at the argument that the relator had made a motion to dissolve the injunction, before the order of April 7, 1888, and the concluding sentence of the opinion of the learned president of the court below indicates that such was the fact, and that the order was made with special reference to a hearing on that motion.

If that fact were before us I should be of opinion that the inspection directed by the order was within the regular powers

1. The record will show that the proceedings were entirely regular and according to due process of law, there being "actor, reus, judex, regular allegations, opportunity to answer, and a trial according to some settled course of judicial proceeding:" Murray v. Improvement Co., 18 How. 272, 280. The defendant demurred to the bill, thereby admitting all its allegations, which, as he never filed an answer, are still to be taken as admitted upon the pleadings. He at the same time moved to dissolve the preliminary injunction which had previously been granted and continued upon sufficient affidavits. Though the plaintiff had moved for an order to inspect, to enable him to call skilled witnesses to testify as to the identity of the two machines, the defendant became, at this stage, the actor on his own application for relief from a lawful decree of the court.

2. The order in this case simply required the defendant to exhibit and explain to examiners selected by the court, a machine which, by his motion to dissolve the injunction and by his affidavits, he had at that time brought to the attention of the court, which was thereby within the control of the court, and, theoretically, in the court room. In such a case as the present, the technical knowledge necessary could be obtained by a court only through a commission such as was appointed. The action of the court in making the order of inspection is sustained by precedents, and the authorities in support of the power of a court of equity to make such an order are neither few nor doubtful: Flight v. Robinson, 8 Beav. 22, 34; Kerr on Discovery, 1, 2, 165, 277; Earl of Lonsdale v. Curwen, 3 Bligh 168; Kynaston v. East India Co., 3 Swan. 261; Barlow v. Bailey, 18 Week. R. 783; Singer Mfg. Co. v. Wilson, 13 Week. R. 560; Morgan v. Seaward, 1 Web. 169; Patent Type Foundry Co. v. Walter, Johns. 727.

3. At common law, the authority to issue attachments for contempt was inherent in courts of justice, and the power was expressly confirmed by Magna Charta: 4 Bl. Com. 286. Did the act of 1836 repeal this common law power? This was fully considered in Tome's App., 50 Pa. 298, in which it was said: "Whatever may be the criminal nature of the disobedience which brought him into contempt, the attachment in this case partakes of the nature of a civil remedy to enforce obedience to the decree, not merely to punish for contempt." This

the said complainant giving the said experts such a particular description of the last mentioned invention as may be necessary to enable the comparison to be made; and the said experts shall further make such drawings of the machine known as the 'Keely Motor' as they may consider necessary for the information of the Court, and report jointly or severally; and it is further ordered that the information obtained by the inspection by the complainant and his counsel, or by the said experts, shall not be used for any other purpose than for the proper hearing and adjudication of the present proceeding."

At the time this order was made the cause was not at issue. No answer had been filed, and, of course, there was no examiner or master. At this stage no legal testimony could have been taken. The plaintiff had obtained his special injunction, which was duly continued within the five days. There was then no further step which the plaintiff could properly take except to put the case at issue. After issue joined, an examiner could have been appointed, and the proofs taken in an orderly manner. Instead of so proceeding a commission of experts was appointed to examine the defendant's machine, and the order of April 7th was made by which the defendant, in advance of any issue, was not only required to exhibit his machine, but also to operate it, and to explain the mode of its construction and operation, although it clearly appeared that it would require considerable expense to clean the machine, put it together, and operate it. The defendant appears to have been willing to exhibit it, and in point of fact did so. In view of this I have not considered it necessary to review the authorities upon the question of the power of the Court to compel him to exhibit his machine before the issued joined. That he might have been compelled to do so at a proper stage of the cause is conceded. But to make an order not only to exhibit, but to operate it, the practical effect of which was to wring from him his defence in advance of any issue joined, was an excessive and improvident exercise of chancery powers. It is the more remarkable from the fact that the plaintiff's case, as shown by the exhibits and drawings, was sealed up in an envelope and retained by the Court, access to the same being not only denied to the defendant, but even to the experts appointed by the Court.

It is not necessary to discuss the question how far the motion to dissolve the injunction justified these proceedings. Upon that motion the defendant was the actor, and if his affidavits failed to satisfy the Court that the injunction should be dissolved his motion would necessarily fall. Aside from this the motion to dissolve was made more than three months after the order of April 7th, as appears by the docket entries.

We are of opinion that the order referred to was improvidently made. It follows that the learned Court had no power to enforce it by attachment.

The relator is discharged.

Opinion by PAXSON, C. J.

Concurring opinion by MITCHELL, J.

It was stated without challenge at the argument that the relator had made a motion to dissolve the injunction, before the order of April 7, 1888, and the concluding sentence of the opinion of the learned President of the Court below indicates that such was the fact, and that the order was made with special reference to a hearing on that motion.

If that fact were before us I should be of opinion that the inspection directed by the order was within the regular powers of a Court of equity, especially where it was concurred in by the relator himself for several months, nominally complied with, and not objected to until he found it was to be a real examination which was to bring his discovery to a genuine test before a competent mechanical tribunal.

But the record unfortunately does not show any application to dissolve the injunction until October 25th, several months after the order for inspection; and as on a hearing of this kind we can review only the regularity of the proceedings upon their face, we are bound by the dates as they appear on the record.

Upon this ground I concur in the opinion of the Court that the order for inspection was premature, and the commitment for contempt in not obeying it was therefore improvidently issued.

KEELY *v.* WILSON.

January 28, 1889. THE COURT. For the reasons given in Commonwealth *ex relatione* John W. Keely *v.* The Superintendent of the Philadelphia County Prison, just decided, the order of the Court below of date of November 17, 1888, committing the said John W. Keely to the county prison, for contempt, is reversed and set aside.

Opinion by PAXSON, C. J. L. L., JR.

Common Pleas.

C. P. No. 1. December 3, 1888.

Struble & Voetter v. Pennsylvania Railroad Company.

Discrimination—Act of June 4, 1883—Demurrer to statement—Practice.

This was an action of assumpsit to recover alleged overcharges of freight paid by plaintiffs to petition asserting ownership of the inventions known as the Keely Motor, and prayed to be made a party to the suit; deferred, but "the said company to have leave to name an expert to act with the commission named in the order of April 7, 1888." Upon the suggestion of the petitioners, W. Barnet Levan was appointed.

On July 7, 1888, upon affidavit of plaintiff filed, a rule was entered upon the defendant to show cause why he should not be attached for the refusal or failure on his part to obey the order of April 7th. To this rule the defendant answered, and various affidavits, exhibits, majority and minority reports of the experts, were filed, from which it was claimed, on the one side, that the defendant was in contempt of said order, and on the other, that he had complied therewith so far as was in his power. It appeared from some of the papers that, upon the appointment of the commission, the plaintiff had placed in the hands of Dr. Cresson, one of the experts, a sealed envelope containing a particular description of the assigned machine of 1869, which in the order of April 7th, the plaintiff was required to give to the said experts to enable them to make the comparison, which envelope, however, by direction indorsed by the plaintiff was not to be opened and its contents examined until after the experts had completed the investigation of defendant's machine. At a hearing on September 18th, this envelope was placed in the hands of REED, J., where it remained unsealed, the rule to show cause being continued.

On October 25, 1888, the defendant entered a rule to show cause why the injunction should not be dissolved, and the same day a rule to have the plaintiff's sealed statement opened and submitted to counsel. Various reports, exhibits and affidavits were filed. On November 10th, on hearing, the rules to dissolve the special injunction, and to have complainant's sealed description opened and submitted, were denied, and the rule for attachment against the defendant was made absolute.

On November 17, 1888, formal orders were entered adjudging the defendant to be in contempt for disobedience of the order of April 7, 1888, and directing the issuance of an attachment returnable forthwith. The same day the defendant presented himself at the bar of the court, and, opportunity being given to purge himself from the adjudged contempt,

1. An order of court is complied with when the respondent has done all in his power to comply with it. An implied proviso annexed to every order of court is, that it can be performed. The defendant protested that he had explained his machine to the best of his ability, and yet, because a majority of a body of strangers did not understand his explanation, he is committed to imprisonment. When a person charged with a constructive contempt, answers to a rule that the matters alleged against him are not true and sets out a state of facts consistent with his innocence and that there was no intention to interfere with the process of the court, he is to be discharged; and it is error for the court to proceed and hear evidence of the truth of the original affidavit and the falsity of the answer: Burk v. State, 47 Ind. 528.

2. It is true, the courts have large discretion in the matter of judging contempts of their orders. But no court can arbitrarily make that possible, which is impossible. "The judicial department has no will in any case. Judicial power, as contradistinguished from the power of the law, has no existence. Courts are the mere instruments of the law, and can will nothing. When they are said to exercise discretion, it is a mere legal discretion; a discretion to be exercised in discerning the course prescribed by law, and when that is discerned it is the duty of the court to follow it. Judicial power is never exercised for the purpose of giving effect to the will of the judge, but always for the purpose of giving effect to the will of the legislature; or, in other words, to the will of the law:" Chief Justice MARSHALL, in Osborn v. Bank of the United States, 9 Wheat. 738.

Mr. Rufus E. Shapley (with him *Mr. W. C. Strawbridge*, *Mr. J. Bonsall Taylor* and *Mr. A. S. L. Shields*), for the plaintiff below:

A glance at the bill will show that the court certainly had jurisdiction in the premises, for it alleges a title in the plaintiff to an unpatented machine or invention, prays for an injunction and account and the specific performance of an agreement assigning to plaintiff, not only the machine or invention, but all the improvements thereon. The only question, therefore, properly brought before this court, is as to the regularity of the proceedings as they appear of record.

filed a long statement verified by affidavit, setting forth all the proceedings of the experts in their investigations; the refusal of Dr. Cresson to open the plaintiff's sealed description and submit the same to the commission of which he was chairman; the submission by the defendant to the commission of all the parts of his machine and the drawings and specifications from which the same were made; the inability of the defendant to put a portion of the machine into an operative condition without an expenditure of money which he could not supply; the averment that one of the experts upon the commission had denounced the defendant and his invention for years, and that another in a more qualified manner had derided it; the defendant, therefore, disclaiming all contempt or disobedience of the process, of the court, etc. Thereupon the court, FINLETTER, P. J., made the following order:

"And now, November 17, 1888, the said respondent, John W. Keely having been brought into court by the attachment issued in these proceedings, and having been required by the court to purge himself of the contempt of which he is convict, or show cause why he should not be further dealt with as to the court may appear proper; and the said John W. Keely not having purged himself of said contempt, and not having shown cause why he should not be further dealt with, after hearing the said John W. Keely, and upon full consideration, it is decreed and adjudged that for the said contempt the said John W. Keely shall be committed to the county prison, to be there kept and confined in custody until he shall have purged himself of said contempt, and until he shall have been legally discharged from said contempt."

The commitment shown in the return to the writ of habeas corpus having been issued and executed, the petition upon which this cause was instituted was filed, and on the return of the record upon the writ of certiorari, the petitioner specified that the court erred:

1. In ordering the defendant to exhibit and explain an invention to persons having no relation to the action nor to the orderly administration of justice in the case, the title to which invention was in suit.

2. In making any such order before answer filed or any issue in fact was joined between the complainant and the defendant.

notice was served upon defendant that upon Saturday, January 7th, the plaintiff would move for an order compelling defendant "forthwith to exhibit to the complainant, Bennett C. Wilson, and permit him to inspect all models, machines, drawings and descriptions in your possession of the inventions referred to in the assignments set forth in the bill in equity herein, and known as the Keely Motor, and of all improvements thereon made by you subsequent to the fourteenth day of August 1869, and compelling you to explain and disclose the same fully to said complainant, together with the mode of constructing and operating the same." On January 7th, the injunction was "continued until further order of the court."

On February 21, 1888, the defendant demurred to the bill, assigning as causes of demurrer: (1) Insufficient description of the machine; (2) Laches; (3) Multiplicity. On March 16th, the demurrer and the motion for the order of inspection, with various affidavits in support thereof, were argued, and on April 7th, the court, FINLETTER, P. J., filed an opinion, the concluding portion of which was as follows, to wit:

The Keely Motor, if the proofs exhibited are to be relied upon, produces immense power, and the means used are a little air and water. It has also the self-creating reacting power. It would, therefore, seem to have a similarity with the machine of 1869. It is the principle of a machine, and its results, which give character to it, and not its physical conditions. The principle of steam as a motive power is the same, no matter what the form of the machine may be in which or by which it is produced. It is still a steam-engine. And so with electricity, or anything from which power is produced.

It is obvious that in this inquiry the most satisfactory testimony would be that of witnesses who have seen both machines and understand their construction, the means used, and the principle of their operation. The evidence of all others must, in its nature, be useless or misleading. It is enough to say, in this connection, that we cannot regard as satisfactory any of the affidavits presented by the defendant, except his own. He says that his invention termed the Keely Motor, is based on the discovery of a scientific fact made long after he ceased to have any business relation with the complainant, and that the of the defendant to the county prison for contempt. The said commitment was based upon disobedience to the order of court of April 7, 1888. This order was as follows:

"And now, April 7, 1888, in accordance with the opinion heretofore filed in this case, it is hereby ordered by the court that the defendant, the said John W. Keely, shall within thirty days exhibit to the said plaintiff, his attorneys, and to Charles M. Cresson, Thomas Shaw, Prof. Wm. D. Marks, and Jacob Naylor, Esq., who are hereby appointed by the court as experts, the inventions, machines, or devices referred to in the plaintiff's bill, and now known as the Keely Motor, and shall then and there in their presence operate the same or cause them to be operated, and explain the mode of constructing and operating to them. And the said experts are hereby authorized and directed to make such an examination of said machines as will enable them to inform the court as to their identity in construction, principle, or operation with the invention described in the complainant's bill as having been assigned him in 1869 by the respondent, the said complainant giving the said experts such a particular description of the last mentioned invention as may be necessary to enable the comparison to be made; and the said experts shall further make such drawings of the machine known as the Keely Motor as they may consider necessary for the information of the court, and report jointly or severally; and it is further ordered that the information obtained by this inspection by the complainant and his counsel, or by the said experts, shall not be used for any other purpose than for the proper hearing and adjudication of the present proceeding."

At the time this order was made the cause was not at issue. No answer had been filed, and, of course, there was no examiner or master. At this stage no legal testimony could have been taken. The plaintiff had obtained his special injunction, which was duly continued within the five days. There was then no further step which the plaintiff could properly take, except to put the case at issue. After issue joined, an examiner could have been appointed and the proofs taken in an orderly manner. Instead of so proceeding, a commission of experts was appointed to examine the defendant's machine, and the order of April 7th was made by which the defendant, tial element in the case. The accident was an unfortunate one, but we cannot hold the defendant company liable therefor in damages in the absence of any sufficient proof showing negligence on their part.

Judgment affirmed.

PER CURIAM. C. K. Z.

Jan. '89, 114. January 12, 1889.

Com'th ex rel. Keely v. The Keeper of County Prison.
Keely v. Wilson.

Contempt of Court—Attachment—Discovery—Practice—Inspection—Act of June 16, 1836.

In a proceeding in equity where the matter in contention is the identity of a certain invention or machine, claimed by the complainant to be identical with one assigned to him by defendant, the Court has no power before issue joined to compel the defendant to exhibit his machine to experts, and to operate it, and explain the mode of its construction and operation, so as to extort from him in advance his defence to the case. It has moreover no power to commit for a contempt consisting of a disobedience to such order.

When a *habeas corpus* is issued to the keeper of the county prison, and a return made of a warrant from a Court showing a commitment for contempt, but not stating in what respect the contempt consists or any of the particulars thereof, *semble* that the Court would in ordinary cases discharge the relator on the ground that the commitment was vague and insufficient.

A Court has power notwithstanding the provisions of the Act of June 16, 1836 (P. L. 793), to commit a suitor to prison for disobedience to an order of the Court entered at a proper stage of the proceeding, directing him to submit to a commission of experts a machine or invention, and to explain the method of its operation and construction.

In the Supreme Court.

Habeas corpus by the Commonwealth, at the relation of John W. Keely, directed to the Keeper of the Philadelphia County Prison.

Certiorari to the Common Pleas No. 3, of Philadelphia County in the matter of a certain bill in equity wherein Bennett C. Wilson was complainant, and John W. Keely, defendant.

The facts of the case were as follows: On January 3, 1888, Bennett C. Wilson filed a bill in equity against John W. Keely, setting forth the fact that the plaintiff was the assignee of said Keely of a certain principle or machine invented by Keely, known to him, as "The re-acting vibrating motor;" said machine being independent of any outside appliances to produce the motion and power, viz., a revolving globe with the necessary connections and appliances, said globe being the centre for the dispensation of said motion and power, and where all the actual power is produced, dependent only on itself for this production and reaction (unlimited).

The bill set forth an assignment, duly executed for a valuable consideration on August 31, 1869, and further averred that the defendant, Keely, was exhibiting and selling various interests in a motor invented by him known as the "Keely Motor," which the plaintiff had reason to believe was in construction, principle, and mode of operation the same as the motor assigned to plaintiff as above. And further that the defendant had neglected and refused to permit complainant "to have access to and examine the drawings, models, and machines embodying the invention referred to in the assignments hereinbefore named in the possession and under the control of said defendant."

The complainant further set forth that he believed that the defendant unless restrained by order of the Court would sell and assign his invention to others and dismantle and alter the same.

The prayers were that the defendant be enjoined from removing the machines or models known as the "Keely Motor," and referred to in the assignments hereinbefore named, from the shops or places where the same are now located, and from changing, altering, adding to, taking from, or otherwise varying the construction or mode of operation of the same. And also from selling, assigning, or using the same. And particularly that the defendant be compelled forthwith to exhibit to complainant drawings and descriptions in the possession of the defendant, of the invention referred to in the above named assignments, and known as the "Keely Motor," and of all inventions made by the said defendant subsequent to the fourteenth day of August, 1869, upon said original invention or pertaining thereto, and of all improvements thereon, and that said defendant be compelled, by an order of this Court, to explain and fully disclose to your complainant all of said inventions and the mode of constructing and operating the same.

On the same day a five days' injunction was granted which on January 7, 1888, was continued until further order of the Court. On February 29, 1888, a demurrer was filed to the bill. The Court, in an opinion by FINLETTER, P. J., filed March 16, 1888, overruled the demurrer and granted an order for the inspection of the machine by experts. At the close of the opinion the Court stated "upon the return of the order for inspection the motion to dissolve the special injunction will be determined." The record did not disclose any previous motion on the part of defendant to dissolve the injunction. Subsequently the Court entered the following order:—

"And now April 7, 1888, in accordance with the opinion heretofore filed in this case it is

To Rufus E. Shapley, A. S. L. Shields, Strawbridge & Taylor, Esqs., Attorneys for complainant.

Mr. Shields: I desire to have placed formally upon the minutes the order of court of September 23, 1888, modifying the order of April 7, 1888, for inspection, which appears on the record certified to the Supreme Court.

The motion was allowed.

February 1, 1889. Opinion by FINLETTER, P. J.

The opinions filed by the Justices of the Supreme Court in the above matter seem to be based upon a misconception of the true proceedings, and in reliance upon facts not appearing in the record, and which never had existence.

Respect for that tribunal therefore requires us to show wherein they have been misled; and a proper regard for our own will excuse the desire to free ourselves from the reproach of irregularity.

From the opinions filed by the learned Court it is apparent that the order to inspect was a proper one if made after an issue was raised, and could have been enforced by attachment and imprisonment.

Justice Mitchell says: "It was stated without challenge at the argument that the relator had made a motion to dissolve the special injunction before the order of April 7th, 1888, and the concluding sentence of the opinion of the learned Judge indicates that such was the fact, and that the order was made with special reference to the hearing on that motion. If that motion was before us I should be of opinion that the inspection directed by the Court was within the regular power of a Court of Equity, especially when it was concurred in by the relator himself for several months, nominally complied with until he found it was to be a real examination, which was to bring his discovery to a genuine test before a competent mechanical tribunal."

Chief Justice Paxson says: "The order of April 7th, was made by which the defendant in advance of any issue was not only required to exhibit his machine, but also to operate it and explain the mode of its construction and operation, although it clearly appears that it would require considerable expense to clean the machine, put it together and operate it."

The learned Judge cannot have had his attention called to the fact that the order referred to was modified, and Mr. Keely was relieved from operating the machine. The order is in the relator's paper book, page 31, as follows: "That the experts shall meet again with notice to Mr. Keely, and shall make as full an examination in the presence of Mr. Keely as they can of the machine and the things connected with it up to the point of putting it in actual operation, and then, if that cannot be done because Mr. Keely has not the money, let the experts report to us up to that time what they have done."

In this case the defendant had filed a demurrer, and a motion to dissolve the special injunction, which was heard with the motion for inspection March 14. Upon each of these three questions affidavits which appear of record were presented and made the bases of the decree of the Court. This evidence, moreover, raised the issue of the similarity of the machines, and upon that issue the defendant demanded the judgment of the Court.

The decision of the Supreme Court appears to be based also upon an error of one of the clerks of the Prothonotary. The Chief Justice says: "The motion to dissolve was made more than three months after the order of April 7th, as appears by the docket entries."

It should be clearly manifest from reading the record, that the motion to dissolve was made before April 7th, and a decree thereon filed upon that day as follows:

"The demurrer is overruled with leave to answer; the order for inspection is allowed; upon the return thereof the motion to dissolve the special injunction will be determined."

This decree is indorsed filed April 7th, 1888.

It cannot be doubted that a decree which determines a question is evidence conclusive that the question has been presented in a proper manner, either by writing filed, or by a motion made at bar.

PENNSYLVANIA

STATE REPORTS.

VOL. CXXIV.

CONTAINING

CASES ADJUDGED

IN THE

Supreme Court of Pennsylvania.

BY

BOYD CRUMRINE,

STATE REPORTER.

VOL. IX.

CONTAINING

CASES DECIDED AT JANUARY TERM, 1889.

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1889.

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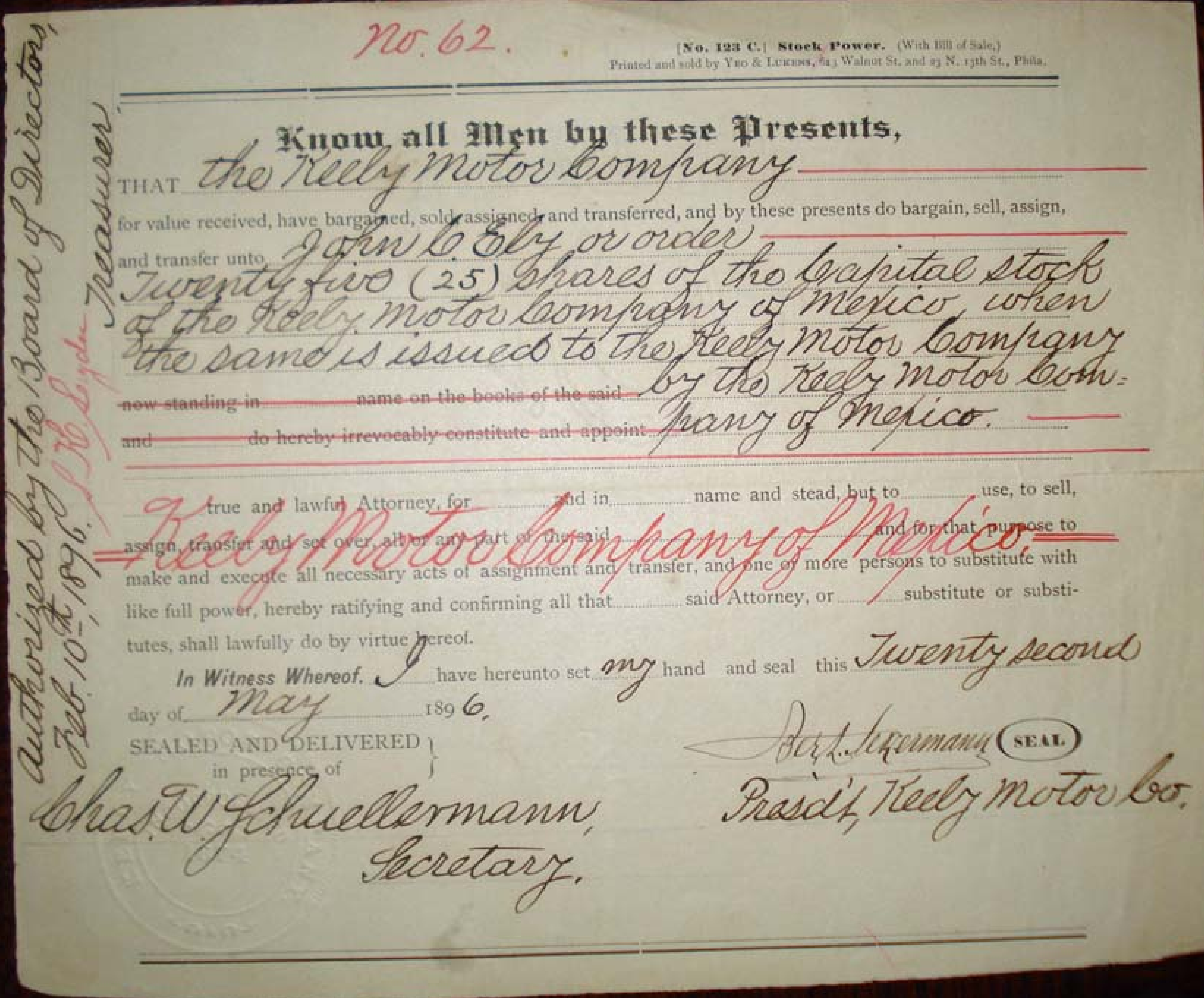


No. 62.

[No. 123 C.] **Stock Power.** (With Bill of Sale.)
Printed and sold by Yeo & Lukins, 613 Walnut St. and 23 N. 13th St., Phila.

Know all Men by these Presents,

THAT the Keely Motor Company for value received, have bargained, sold, assigned, and transferred, and by these presents do bargain, sell, assign, and transfer unto John C. Ely or order Twenty five (25) shares of the Capital stock of the Keely Motor Company of Mexico, when the same is issued to the Keely Motor Company ~~now standing in name on the books of the said~~ by the Keely Motor Company of Mexico. ~~and do hereby irrevocably constitute and appoint~~

true and lawful Attorney, for and in name and stead, but to use, to sell, assign, transfer and set over, all or any part of the said Keely Motor Company of Mexico. and for that purpose to make and execute all necessary acts of assignment and transfer, and one or more persons to substitute with like full power, hereby ratifying and confirming all that said Attorney, or substitute or substitutes, shall lawfully do by virtue hereof.

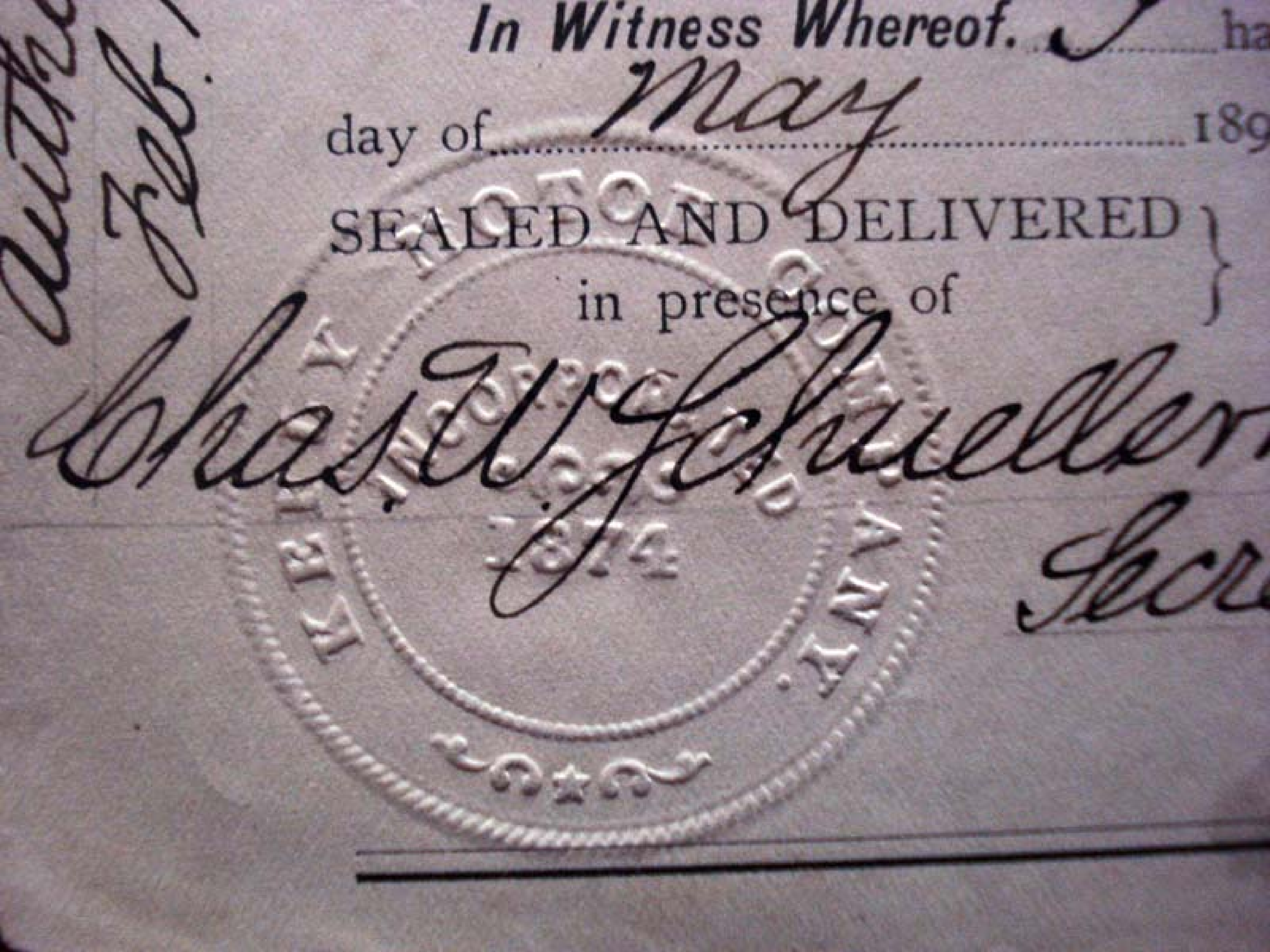
In Witness Whereof, I have hereunto set my hand and seal this Twenty second day of May 1896.

SEALED AND DELIVERED in presence of

Chas. W. Schuellermann,
Secretary.

(SEAL.)
Presd't, Keely Motor Co.

Authorized by the Board of Directors, Feb. 10th, 1896.
J. H. Snyder Treasurer,



In Witness Whereof. I ha

day of May 189

SEALED AND DELIVERED
in presence of

INCORPORATED
1874

Chas. W. Schuelle

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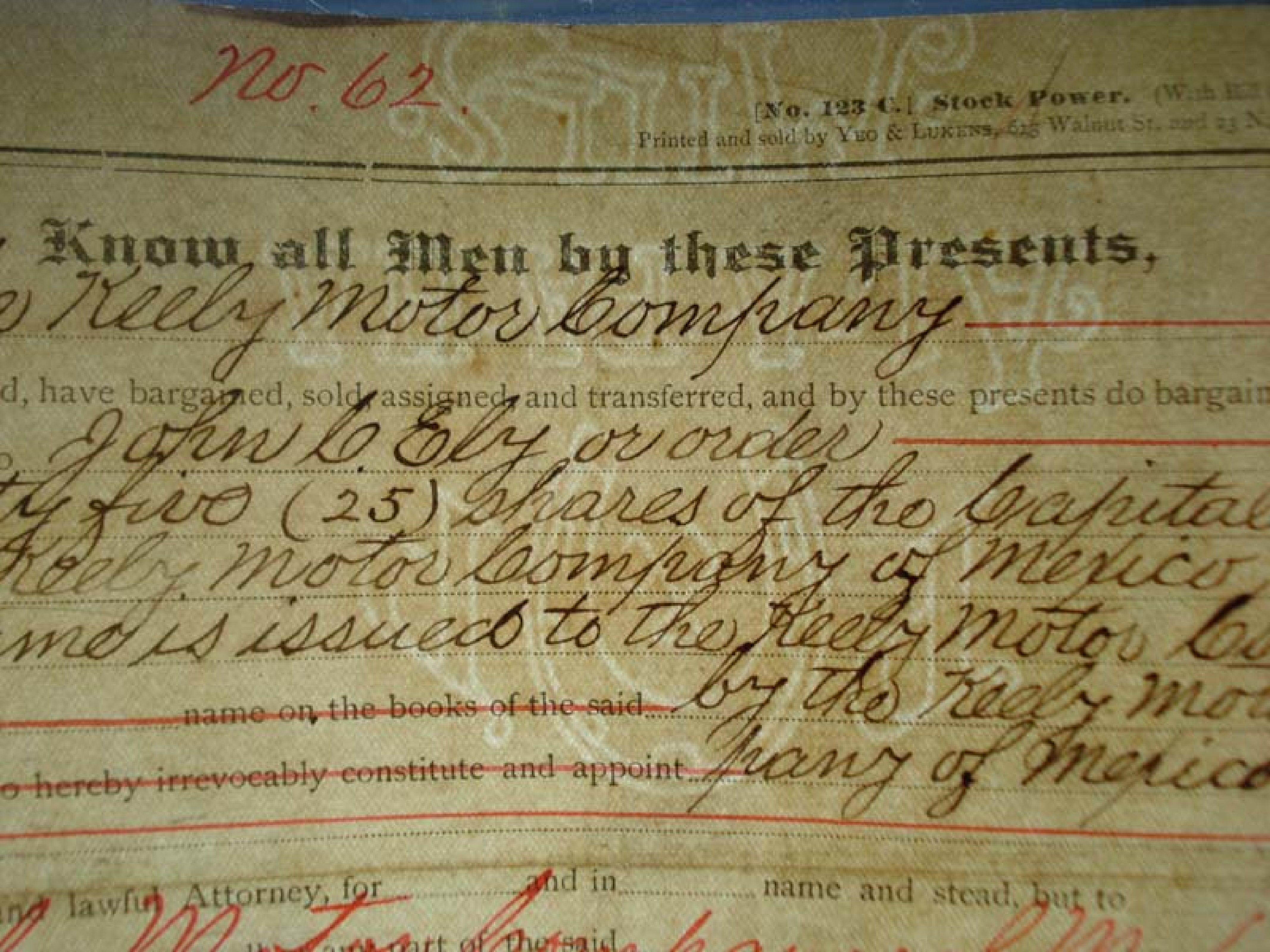

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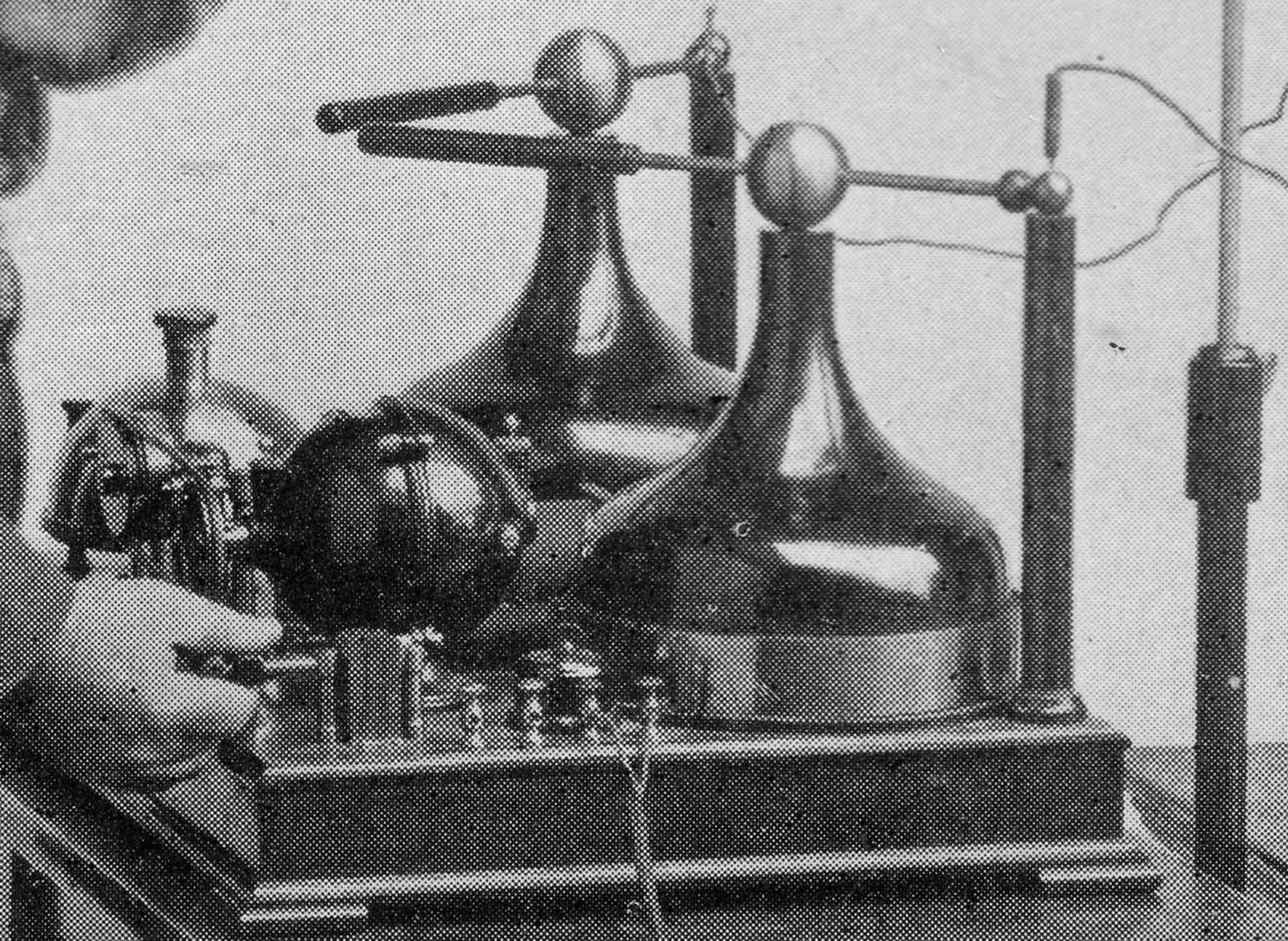
Report of the Committee on the Rontgen Ray.—Dr. CHARLES O. FILES of Portland, Me., as chairman, submitted this report. He said that he had done a great deal of *x*-ray work, and had learned that it was not the size but rather the number of plates that constituted an important factor in such work. One of the members, Mr. E. E. Kinraide of Boston had recently brought out a coil machine which enabled the exposure to be greatly reduced. This coil was constructed on an entirely new principle, and gave a spark of remarkable intensity.

Mr. E. E. KINRAIDE of Boston said that his object in constructing this coil was to remove the high potential region of the coil as far as possible from the primary, and so remove the danger of destroying the coil so common to the ordinary Ritchie coil. The primary is placed on the outside, so that the lines of force fall away from the primary toward the center, and produce a very high potential there, while there is little or no potential at the outer turns. There is practically no tendency for such a coil to break down. The primary is operated by a form of spark-gap, the efficiency of which is due to a low potential current discharging across a very small air space and producing erosion of copper plates, thus interrupting the primary circuit. The condenser has about 900 volts, and discharges between two copper plates, about six inches in diameter and about $\frac{1}{100}$ of an inch apart. The air-gap is regulated by a lever. In the device used for charging the condenser there is a rotary brake, making about 125 interruptions per minute. With each interruption here, there are from twenty to twenty-five interruptions in the primary circuit of the induction coils, thus giving about 50,000 interruptions a second. It is largely owing to this high frequency that the exposure of the photographic plate can be materially reduced. For the same reason it is probable that the current from this machine will find important uses in electrotherapy. The current is almost identical with that from the Ritchie coil except that it has greater frequency. The Tesla coil gives rather an alternating current.



April 17, 1902.

Mr. T. B. Kinraide,

Jamaica Plain, Mass.

My dear Mr. Kinraide:

I regret that I was called off the other day when you were here and did not have a chance to see you before you left. If you will tell me about what you need in the way of a Crookes' tube I will look over some which I have, and see if there is anything which would suit your purposes. The double focus tubes which are ordinarily made will stand potentials up to four, or five inches or more. They are made for the standard high frequency sets which we have been furnishing for sometime past and you probably know what they are.

I wish again to thank you for the favor of the copies of the enlargements of the spark photographs.

Very truly yours,

Del E T

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For the simple erythema, which may develop after considerable exposure and gives warning to halt before deeper effects are caused, a simple emollient to keep the skin soft and a cessation of X-ray work will usually suffice for treatment. Mr. Kinraide, however, finds the following method immediately abortive: At the first sign of erythema, say on the operator's hands, fill two small pails nearly full with water as hot as can be borne. Add a table-spoonful of bicarbonate of soda to each, immerse a hand in each pail, and let them soak in the alkaline solution till the water cools, or about twenty minutes. This has sufficed to at once relieve the effects. For the dry atrophic state into which the fingers and nails of workers sometime get the negative galvanic current should, on theoretical grounds, do much to restore normal nutrition, but the author has had no case occur in his own practice and hence cannot speak from actual test. The negative galvanic current in a very small amperage is a powerful stimulant of healing processes.

At the meeting of the Roentgen Society in December, 1900, Mr. Kinraide stated that he had personally suffered all the effects of a bad "X-ray burn" from making a series of coil experiments with a very powerful coil without any tube or any X-ray apparatus whatever in use. The author can produce very similar "burns," varying from slight erythema to deep ulcers by passing any considerable static current to the tissues through a sufficient dry resistance. Many seem to be unaware that this can be done.

and heart in which was found
a fond repose

These Eyes that were the windows
of my prison -
and lips thro which my prayers
to God have risen

From these, all these, death's
angel bids me sever.
Dear comrade body fare you
well forever

I go to mine heritage
and going go with all the
Joy the freed soul can know

Yet in my spirit wanderings I
trust I may sometimes pass near
your sacred dust

Fourth Dimension

In the evolution of the line into the square and the square into the cube a new form results whose parts are those of the previous units Thus we form a square with four lines These lines are the units of the structure of the square Six Squares are added to each other to form a cube The units of the structure of the cube are 6 Squares It is evident therefore that if we add cubes togather we obtain another form whose units are cubes

In the Square the 4 lines and 4 points are visible in the cube the lines and points of all the squares are visible in the 4th dimensimal figure the points lines squares and cubes are all visible

Human beings and all beings living in three dimensional bodies cannot have axcess to any other dimensional existence or be in any way conscious of anything outside of the particular three dimension they occupy or beyond their boundaries If such limitation did not exist our powers would be very marvellous such as would be possible to us as we are to which add freedom from our boundaries that limit us physically

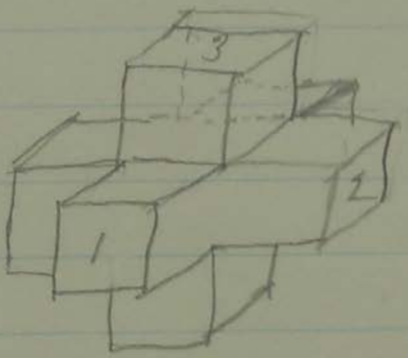
The universe seems vast beyond all comprehension space is to us all but incomprehensible This would not be so if we could pass our boundaries The distance from star to star would be but a little flight and thus would dissapear all concepts formed by our inhibitions such as bind us now

Inasmuch as we have lines and a form construded of lines of 2 dimensions called a square. and a figure constructed of planes or squares called a cube having 3 dimensions then we should have a form composed of cubes that that would have to be known as 4th dimension are there not atoms having poles that unite to form units of length these uniting to form areas and these uniting to form three dimensional forms Having obtained forms that are solid their next evolution would be expansion of that form This expansion of the three dimensional form must then be the fourth dimension of evolving form The next would be the fifth and so on until the ego at work has come to that dimension that is a measure of its cohering power as a form

No Matter how vast we may make three space — even if it be extended to the boundaries of the universe if that were possible — fourth dimension would still bear the same relation to three space that three space bears to two space

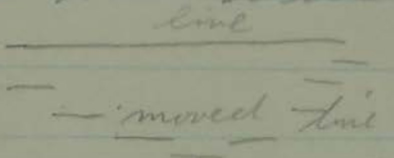
The ratio of magnitude of three space is determined by two space . so the ratio of four space is determined by three space

The figure produced by placing the cube where the square was placed in the mirror is the figure of 3 dimensions whilst the cube is the cube and not to be confounded With this new figure



The subdividing of a square and the movement of its subdivided parts in the direction of third dimension makes of the square a condition of three dimension as related to its smaller squares

In a like manner a line may be subdivided and its subdivisions moved to positions that exist in two dimensions



If this broken line is viewed from A it will appear to be the same as before it was moved

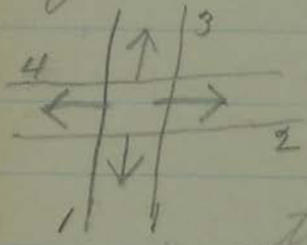
It follows therefore that if we subdivi a cube and move its subdivided parts in the direction of fourth dimension it will appear as a cube still when viewed from fourth dimension

The Fourth dimension

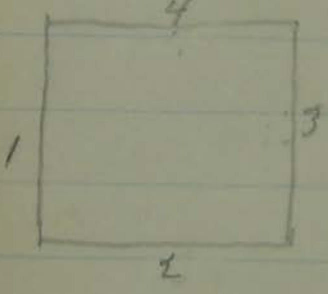
formed by the movement
outward of the contents of the
cube in the direction of its
faces one half of the cube
appearing on each face

a line has length only
A Square has two dimensions measured along the lines that form its boundaries

The square is produced by moving the lines 1, 2, 3, 4 in the direction of the arrows outwardly from the central square until the square is produced



The square thus produced has no surface and is merely space inclosed by the lines 1, 2, 3, 4



One dimension cverges from all
directions upon a point
Two dimensions converge from
all drections at right angles to
to one dimension
Three dimensions converge from
all directions at right angles to
two dimensions
Four dimension converges from
all directions at right angles
to three dimensions

A great number of lines can converge upon a point converging from all directions. To illustrate this use a ball of shellack and stick heated needles into it

A large number of squares can converge upon a line from all directions at right angles to its length or one dimension

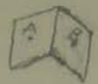
Two cubes can converge upon the two faces of a square from two directions at right angls to its surface all angles Squares Tetrads Cubes and all regular or symmetrical forms can be subdivided into units of their form exactly like themselves but smaller

The Sphere ?

The true Mirror that will reflect a correct Image

This produced by placing two Mirrors at an angle of 90° This gives the image correctly so that the Right hand of the image is the same as the original /

Mirrors producing 4 space

Two plane mirrors are mounted so as to form the two sides of a box  in their interior angles that are 90° we may produce the image of the lines forming the boundaries of a square by placing a wire rod having its ends slightly beveled the ends of the rod resting upon the faces of the mirror marked by the two points A B This will produce ane image of the wire repeated three times and will form with rod itself a perfect square The mirrors it will be seen are entirely in three space relative to the squares they may generate We can now construct a set of mirrors that will make a cube of our square the mirrors extending wholly in the fourth dimension relative to the cube generated by the square in the same meaning of the term as we found in the generation of a square from a line

Law of transposition of Matter

all solid forms may be symmetrically subdivided. The reversing or turning outward of these subdivisions changes the original form to the next higher type. Planes occupy the places of the previous lines generally

The new form will inclose twice the volume. this can only be true of three space

Golden Spiral -> 4th Demensionized
Cube

Transposition of Octahedron

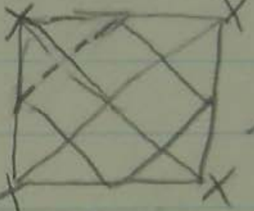
The solid substance of the Octahedron may be subdivided into eight parts these sections may be turned inside out producing a cube whose inside shape is that of the Octahedron

a line has two ends – Points
a square " four edges – lines
a cube " six sides – squares
a Cuboid " Eight faces – Cubic

a line has two points
a Square " four lines
a cube " six Squares
tesseract " 8 Cubes
16 tesseract
12
∞

two points bound lines   three lines bound
triangles four triangles bound tetrahedrons
Tetrahedrons combine to construct
figures in two ways   the apex turned
in or out   20 tetrahedrons (apex in)
fom a sphere having 20 faces

The crossing and intertwining of three three dimensional figures at right angles to each other is produced by six pyramids that form a cube when put togather. a section is removed from the corners of each of the pyramids so that instead of the square forming the base of the pyramid a new square is produced the x mark the sections to be removed



These when put togather so as to form a cube will produce three three dimensional solids crossing each other at right angles

Intersecting or Crossing Planes

Three planes cross each other at right angles in a cube of eight cubes

Four planes cross each other in the subdivision of a cube into six pyramids the faces of the cube being the bases of the pyramids   Four planes cross eachother in the four square segment of the double pyramid formed by removing a double pyramid from its two apeces to their meeting place at the centre

all pyramids are inclosed by eight planes   The tetrahedron is inclosed by four planes   In pairs they can cross at right angles

In three intertwined pyramids eight planes cross at its centre

Two intertwined Tetrahedrons inclose a space bounded by eight planes

The dodecahedron is formed of six double pyramids and has sisc planes crossing in the directions of from line to line crossing the cube

Three Dimensional planes

These are found in the construction of a cube with cubes The line of cubes extending from the corners to the centre and those extending from the edges inward represent a three Dimensional plane that takes the place of the planes of the cube when the two dimensional pyramids are used

These planes can be traced in all forms constructed of cubes The Cube face extends inside this line or form

Boundaries are the limits of all dimensions beyond which they do not extend

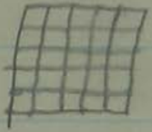
What is a three dimensinal boundary how many boundaries has fouth Dimension in points lines planes and ?

Transposition of cubes

Occupying four positions Hidden or obscure
Inferior Mediocre Superior

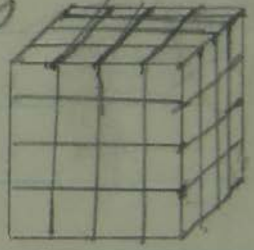
The determination of a higher dimension from a lower is based upon the higher conditions of expression found in the lower

A square is divided into smaller squares thus



It will be seen a once That the squares at the corners have an advantage over all the other squares since two of their sides are exposed whilst the others have only one

A cube is subdivided into smaller cubes



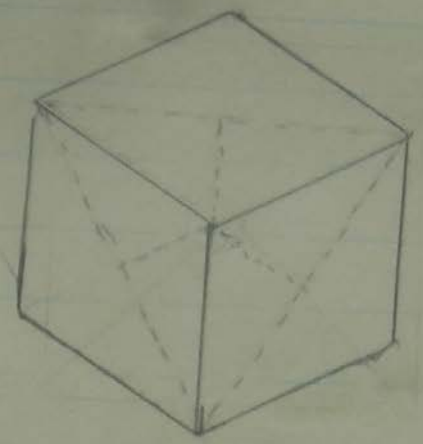
It is evident that the corner cubes occupy a superior position over the edge cubes and these in turn have an advantage over the face cubes The corner cubes having three sides exposed, the edge cubes have two. and the face cubes one

From the preceeding it is evident that

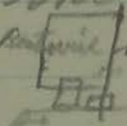
The next higher form will have the following conditions Its face cubes will have two sides exposed its edge cubes will have three and its corner cubes four sides exposed   This is realized in the Rhombahedron having faces formed by the edges of cubes   The next higher form will have three sides of the cubes forming the faces exposed the edges will have four sides exposed and the corners five. This is a description of the cubic Octahedron. The next higher form will have four sides of its face cubes exposed, the edges will have five sides exposed and the corners six This form is the Rhombic Dodecahedron having edges of cubes alternating with each other across its face

The next higher form will have five sides of the cubes forming its faces exposed Its edges will have six

and its corners six sides exposed The next higher dimension The cubes forming its sides will have six sides exposed The edges will have six sides exposed The corners will have six sides exposed All the hidden cubes that have been hidden within the cube have in the seventh dimension become equal with those on the outside



section of cube producing when turned outward three twining cubes

If a small nitting needle is fixed in a support so that it stands perpendicular to the surface of a table. a wire is bent to form the three sides of a square and fixed in a light support so that the nitting needle forms the other side of the square thus 

if we lookdown in the direction of the length of the needle we see that the bent wire square occupies but a small portion of the region about the netting needle, and that we could place a number of such squares around the nitting needle each of which would have the needle as their fourth side.

It is possible for the figures
bounded by corners of planes
to be the third dimension
three dimensions should have
3 planes crossing each other at
right angles

The Cube has on subdivision six pyramidal sections having their apexes at the centre The Rhombic Dodecahedron has twelve pyramidal sections having same angle as Cube but having the corners of the pyramid at the centre

The Rhombic Dodecahedron has the same faces as the Octahedron except that they are cubic By placing the right sections of the Dodecahedron on the faces of the Octahedron the latter is changed to the former

⊕

Points Bound lines, lines bound planes, Planes bound cubes, Cubes bound fourth Dimension

The adding of lines to any two dimensional form does not cause it to become a three dimensional one if added in the same plane we may thus make a four out of a three sided figure or a five sided but this does not cause it to become three dimensional

The addition of faces to a three dimensional figure cannot therefore cause it to become fourth Dimensional no matter how many may be added we must assume therefore that the statement that is made that the fourth Dimensional cube has eight faces is not correct since the boundaries of two dimension stop at the third dimension and the fourth must be bounded by cubes and also that it must have eight cubic

⊕

Boundaries In other words it will have eight faces formed of cubes. This figure is realyzed in the cubic Octahedron

a square has four one dimensional sides, a cube has six two dimensional faces. the cubic octahedron has eight cubic faces

Progression of boundaries ⊕

A line is bounded by two points a square is bounded by four lines a cube is bounded by six squares The addition of more lines to a square will not make it three dimensional if the added lines are in the same plane neither will the addition of more squares to a cube make it fourth dimensional if in the same three space an infinite plane may be divided by two lines crossing it at right angles so that plane beings living in such a universe would be unconscious of those living on the other side of the lines dividing one portion of two space from the other (this is an asumption)

The cleaving of space by three infinit planes at right angles to each other divides space into eight three dimensional regions seperated from each other by three boundaries that limit each of the three dimensions completely seperating them from each other; since a three dimensional being could occupy and precieve that dimension only in which he was. the other seven three-dimensional spaces would be invisible and would lie beyond the boundaries of his world

2 Points determine a line 3 points determine a plane 4 points determine three dimension 5 points determine four dimension

The movement of one point in one dimension space produces a line

The movement of two lines in two dimensional space in directions that cross each other produces a square

The movement of three squares in three dimensional space in directions that cross each other produces a cube

The movement four cubes in four dimensional space in directions that cross each other produces a cube of cubes

Controller for Areoplane

An instrument that would control the movements of an Areoplane in a perfect manner is a Compound Gyroscope having six heavy rotating disks mounted on seperate shafts all shafts converging to one centre from the six fly wheels. Each pair of wheels will be on opposite ends of a shaft seperated at its centre so as to rotate each pair in opposite directions Such a device under high speed of rotation could not be twisted from its position in any direction The areoplane proper would be hinged to this device so as to change it to diffrent angles for scaling circling descending

Wind blasts could not tilt or turn such a device

W. Thomas Burton Kinraide
grandfather of

Claudie S. Kinraide
13 Winthrop Rd.
Wayland, MA 01778

So we must part forever.
And, though I long have beat my wings and tried to, free from thy narrow limits and control, forth into space the true home of the soul

Yet now, yet now that mine hour is drawing near, I pause reluctant, finding you so dear.
All joy awaits me in the realms of God
Must you my comrade moulder neath the sod?

I was your prisoner yet you were my slave!
Your captive, yet, obedient you gave. to all mye earliest wishes and commands
Whilst now to the worms I give these willing hands that toiled for me or heald the book I read
These feet that trod whe'ere I bid them tread
These arms that clasped my dear ones close

N° 15,246 A.D. 1898

Date of Application, 12th July, 1898—Accepted, 10th Sept., 1898

COMPLETE SPECIFICATION.

Improvements in Automatic Break or Interrupter Apparatus for Electric Currents.

I, Thomas Burton Kinraide, of 38, Spring Park Avenue, Jamaica Plain, in the State of Massachusetts, one of the United States of America, Electrician, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

It is the object of my invention to provide an improved automatic break or interrupter for electric currents, my invention being particularly adapted for use in interrupting the primary current of induction coils in connection with X-ray and kindred apparatus.

My invention secures high speed and accuracy of break, the successive breaks being rendered similar and synchronous, provides uniformity of wear of the make-and-break contacts, cures the irregularity and unsteadiness of the current hitherto so objectionable, increases the frequency, and gives uniform action of both current and apparatus under different resistances, besides simplifying and prolonging the life of the instrument.

As heretofore constructed, these instruments have had a break hammer carried on the free end of an ordinary leaf-spring vibrating between the core-end of an electro-magnet and a small contact or anvil, the latter being mounted on the end of an adjusting screw in the free end of a post or standard.

One serious drawback to these instruments has been that the speed of interruption, *i.e.*, the speed of the vibrations of the hammer, has been quite limited and there has been an unevenness of break.

I have found that these faults are due to a compound vibration of the instrument which tends to hasten some of the breaks and to retard others, and I have further found that this compound vibration, as I call it, may be obviated and that high speed may be attained and accurate breaks secured by providing an absolutely rigid and unyielding post or standard; as a result of this feature of my invention, the objectionable inaccuracy and unevenness of the breaks or interruptions dissappear, and a nicety of adjustment and compensation is feasible which would not otherwise be possible.

A further objection to the present old style of instrument, above mentioned, is that as the tension of the spring vibrator is increased to vary the electrical resistance of the break, the sparking of the instrument is increased, the current being also otherwise rendered irregular and uncertain, and I have discovered that this is due to the fact that in the adjustment of the vibrator the hammer is thrown more or less out of alignment with the core-end and anvil.

It is therefore one chief feature of my invention to provide means to maintain the hammer in proper accurate alignment with its core and anvil.

Again, irregularity and unsteadiness of current are due to the uneven wear of the contacting surfaces of the hammer and anvil, the intense heat of the constant arcing serving to fuse and batter down the said surfaces unevenly; and therefore I have

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mounted one of these surfaces on a rotatable spindle, so that the irregularities thereof may be automatically removed or obviated by rotating it as the hammer is vibrated.

In order still further to increase the efficiency of the break, I make the several parts thereof laminated, so as to get rid of the heating effects, thereby permitting the break to be extremely rapid.

In this connection also I provide a collector for the lines of force, thereby enabling a smaller hammer to be used with the effect of a large one.

Other advantages and features of improvement will be pointed out in the course of the following description of the details of construction.

In the drawings I have omitted all unnecessary details, confining the drawings to the details of improvement, and it will be understood that the latter may be used in connection with any suitable or preferred general style of apparatus.

Fig. 1 is an end elevation, partly broken away, showing one embodiment of my invention.

Fig. 2 is a top plan view thereof.

Fig. 3 is a broken detail in side elevation, showing a slight modification.

Fig. 4 is a side elevation of the collector, a portion of the hammer being shown in operative position.

Fig. 5 shows a detail of a modified collector.

Fig. 6 is a fragmentary detail in top plan, showing a rigid collector placed on the side of the hammer opposite the coil.

Fig. 7 illustrates one of the objectionable features of the old style instrument.

On a suitable base A is mounted a coil B supported by end supports c, c^1, herein shown as receiving the core b at its ends.

The hammer D, carried by a vibrator E, reciprocates between the core end b^1 and an anvil G, the hammer having a reduced end e held rigidly on the vibrator by a nut e^1.

Heretofore this vibrator has been a leaf-spring h, as indicated in Fig. 7, this spring being deflected more or less to the right when it has been desired to increase the electrical resistance offered by the hammer, the result being as shown in exaggerated form in Fig. 7, where it appears that the spring h when deflected to its dotted position inevitably upsets the hammer, so that the latter, when attracted to the core b^1, strikes the latter with its upper edge d^2 only, thereby increasing the resistance entirely out of proportion to that intended, and tending to burn or fuse the small point of contact d^2, also leaving a spark gap d^3, tending to ruin the hammer; the disastrous effects at the opposite end of the hammer being of the same sort excepting that the contact surfaces being smaller and composed of platinum, said effects are still more serious.

Accordingly, I obviate these disastrous results by making the vibrator E rigid and unyielding for most of its length, as shown at e^2, a short resilient section e^3 being preferably provided at its lower end next to the stud a, to which it is shown as fastened, and the necessary tension being secured by means of an auxiliary or tension spring K on the shank of an adjusting screw k, working at its threaded end in a post a^1 and journaled at k^1 in a standard a^2.

An adjustable thumb nut k^2 receives one end of the spring K, the opposite end bearing against the vibrator E which rides loosely over the screw rod k.

In this preferred form of mechanism for accomplishing my object, turning the screw k to the right or left correspondingly relaxes or tightens the spring K, thereby tending to move the vibrator E bodily forward to a greater or less extent to increase the number of amperes or quantity of current transmitted, and it will be noted that the hammer does not depend on the vibrator for its tension or resistance, but rather on the independent spring K, which bears centrally forward against the vibrator, the yielding section e^3 flexing readily, enough to permit the required movement forward of the rigid portion e^2.

I prefer to place the hammer at one side of the core, directly in the field of the greatest number of lines of force, the direction of the latter being indicated by arrows in Fig. 2, whereby the action of the apparatus is very materially improved; and in order still further to increase the frequency, and to get rid of the heating thereof, so that the brake can be extremely rapid, I make the several parts thereof laminated, as clearly shown, the core being preferably composed of a plurality of wires, and the hammer of a number of plates secured together, although any other means of lamination is within my invention.

In connection with the improved hammer, I provide means for positively limiting its movement, said means being herein shown as a projection or engaging lug e^4 on the vibrator cooperating with a stop e^5 preferably adjustable.

By reason of this construction the length of the spark gap between the hammer D and its anvil G is positively controlled, so that the time period of the interruptions may be regulated to the requirements of the circuit, for discharging the condenser at the proper moment to accelerate the inductive action of the primary of the induction coil with which we will suppose the apparatus is being used.

Adjacent the hammer and preferably above it I provide a collector L for the lines of force, to direct them upon the hammer, whereby a much smaller hammer may be used than would otherwise be possible for the same effect.

In Figs. 1, 2 and 4, this collector is shown as composed of a body of metal L, preferably soft steel or iron and laminated, placed within the field of force of the coil and immediately adjacent the hammer, thereby presenting to the hammer a field of strong magnetic intensity, so that it is equivalent to making the hammer much larger, at the same time permitting a much smaller moving part than usual.

Preferably this collector is movable relatively to the hammer, so that its effect on the latter may be varied, as indicated in Figs. 1—5, where the collector is shown as pivotted at l and as having its lower end convexly curved (Fig. 5) adjacent the hammer D, or internally formed to endorse said hammer (Figs. 1, 4).

By means of the collector the amount of current delivered through the break is readily controlled, inasmuch as the collector tends to gather in the lines of force and direct them to the hammer; so that if the collector is in the full line position, Figs. 1 and 5, the greatest intensity will result, whereas if the collector is in its dotted line position, a less intensity will result, and this may be varied according to the position into which the collector is swung, the resultant effect upon the hammer being that it has an active or sluggish movement according to the position of the collector.

When the collector is swung entirely away from the hammer or in case it is omitted entirely, the tendency of the hammer is to lag or hang to the anvil as it is drawn away, whereas with the collector in its full line position, as shown, the action of the break is short and quick.

The collector is shown as laminated, Fig. 5, showing it applied to a break having its hammer at the end of the core, while the other figs. show the collector applied to the special form of hammer forming part of my new break.

The configuration and position of the collector may be changed to include a greater or fewer number of the lines of force, or into the entire field, according to the effect it is desired to produce upon the hammer, one example being illustrated in Fig. 6 in which the collector L^1 is shown as mounted at the side of the hammer opposite the coil.

With this construction, whenever, by the tearing off of small pieces of the metal from the contact points, the break gap is partially short circuited when open, the rapidly increasing lines of force are so concentrated by the collector upon the hammer as to drag the latter sideways, toward the collector, thus overcoming the short circuit by shearing apart the fused particles and separating the points, the hammer then resuming its normal vibration.

It will be understood that as the hammer end e is pulled away from the anvil G, an arc is formed which inevitably fuses a slight portion of the opposing surfaces, and, as the breaks are rapid these surfaces, although platinum, are quickly rendered uneven.

Accordingly, I provide means to relatively rotate the meeting surfaces of the anvil and hammer, independently of the rotations due to the adjustments of said parts, the said means being herein shown as preferably consisting of a freely rotatable spindle g centrally mounted in a hollow adjusting screw g^1 having threaded engagement with an extended bearing a^3 in the standard a^4, being fixed in its adjustments by a check nut g^2.

The spindle g is rotated by a thumb wheel g^3 pinned on its outer end, and is held against longitudinal movement by a collar g^4 fixed near its inner end to abut against the inner end of the screw carrier g^1.

The spindle is threaded at g^5 to receive the anvil G the latter being shown in the form of a threaded cap provided with a required platinum contact, the platinum being soldered thereon, as indicated in heavy section lines Fig. 1.

The collar g^4 and anvil are made of a size to permit them to be withdrawn together, with the adjusting screw g^1, as the latter is screwed out of the standard a^4.

It is understood that as the platinum points wear and fuse away the anvil is nicely adjusted forward by its screw carrier g^1 to compensate therefor.

Under the old construction the surfaces would fuse and wear unevenly, as explained, and then when it became necessary to adjust the anvil forward, it would be impossible because it would be found that the surfaces had become more or less interlocked, thereby preventing any relative rotation thereof, the result being that the apparatus was rendered useless until the anvil had been removed and the contacting surfaces carefully filed down, not only entailing loss of time but loss of the platinum.

According to my invention the adjusting movement is entirely independent of any rotation of the anvil.

In order to give the most efficient work, the breaks should not only be exceedingly rapid, but they should be even or accurate in synchronism.

Accordingly, I have rendered the standard, which supports the anvil, absolutely rigid and non-vibrant, finding as a result that the accuracy of break which is sought is thereby attained, and that the speed or note of vibration is raised, this being due to the prevention of compound vibrations.

I prefer to render the standard thus rigid by interposing a bar or brace M, Figs. 1 and 2, or M¹, Fig. 3, of insulating material between opposite posts of the frame, this bar being let into the frame and held rigid by said screws, the object being to prevent the standard, and hence the anvil, from being responsive to the vibrations of the hammer, and thereby occasioning a compound or confused vibration or interruption of the current.

Various modifications and details of mechanisms may be used to embody my invention.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

In an automatic break or interrupter for electric currents:—

1. A high speed break, comprising a coil and its core, an anvil in electric circuit with said coil, a standard supporting the anvil, and means to render said standard absolutely non-vibrant, whereby compound vibrations are prevented and the speed is increased, substantially as described.

2. A high speed break, having a hammer vibrating between a core-end and an anvil, means to vary the vibrating resistance of said hammer, and means to maintain said hammer in approximately unvarying end alignment with said core-end and anvil, substantially as described.

3. A high speed break, a hammer, a vibrator supporting the same, and an adjustable tension device to vary the resistance of said hammer, said vibrator having an extended rigid portion extending from said hammer, substantially as described.

4. A high speed break, a hammer, a vibrator supporting the same, and an adjustable tension device to vary the resistance of said hammer, said vibrator having an extended rigid portion extending from said hammer and being provided at its

opposite end with means to permit said rigid portion to be deflected slightly, substantially as described.

5. An electric break, having a hammer vibrating against an anvil, and means to adjust the latter, means to rotate said anvil independently of its said adjustment, substantially as described.

6. An electric break, the combination with a hammer, its anvil, and a hollow adjusting screw for the latter, of a spindle carrying said anvil and rotatably mounted therein, substantially as described.

7. The herein described anvil, the same consisting of an interiorly threaded cap, and a centrally extended platinum contact integrally secured thereon, substantially as described.

8. The combination with an electric break having an electro magnet, an anvil, and a vibrating hammer, of a collector to concentrate the lines of magnetic influence on said hammer, substantially as described.

9. The combination with an electric break having an electro-magnet, an anvil, and a vibrating hammer, of a collector to concentrate the lines of magnetic influence on said hammer, and means to vary the position of said collector relatively to said hammer, substantially as described.

10. The combination with an electric break, having an electro magnet, an anvil, and a vibrating hammer, of means to shear or drag sideways the hammer from the anvil whenever the break-gap between the hammer and anvil is partially short circuited by the fusing or clinging of the metal at the contact points, substantially as described.

11. An electric break of the vibrator class, provided with a hammer composed of laminated material, substantially as described.

12. An electric break, a core, a hammer, and collector, to concentrate the lines of magnetic influence on the hammer, said collector being composed of laminated material, substantially as described.

13. The combination with an electric break, having an anvil and a vibrating hammer, of a positive stop to limit and positively stop the movement of the latter from the anvil, substantially as described.

Dated the 9th day of July 1898.

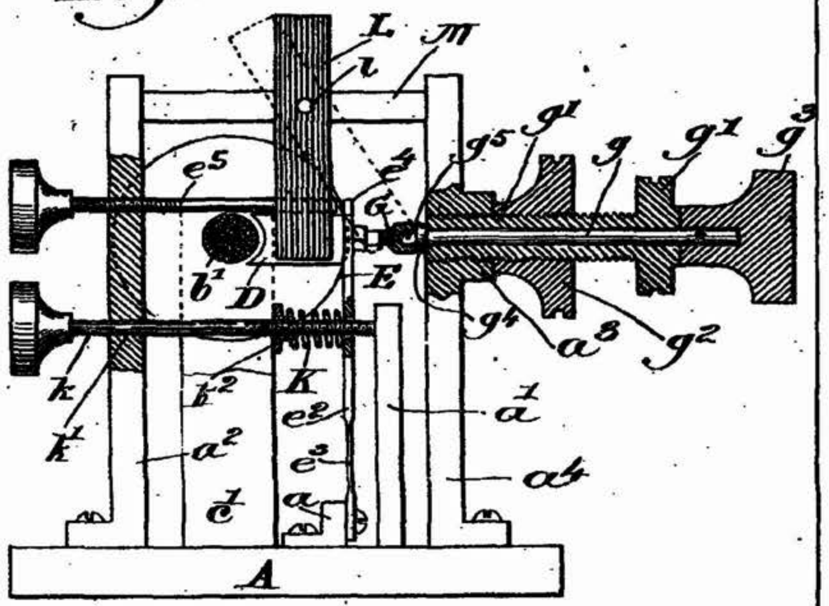
WM. BROOKES & SON,
55 & 56. Chancery Lane, London,
Agents for the Applicant.

Redhill: Printed for Her Majesty's Stationery Office, by Malcomson & Co., Ltd.—1898.

A.D. 1898. JULY 12. Nº 15,246.
KINRAIDE'S COMPLETE SPECIFICATION.

(1 SHEET)

Fig. 1



L
l
M
e⁵
e⁴
G
g⁵
g¹
g
g¹
g³
b¹
D
E
g⁴
a³
g²
k
k²
K
a¹
k¹
e²
e³
a²
a⁴
c¹
a
A

Fig. 4

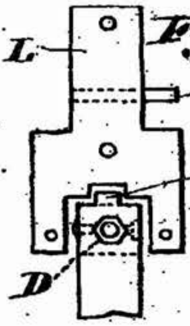


Fig. 6.

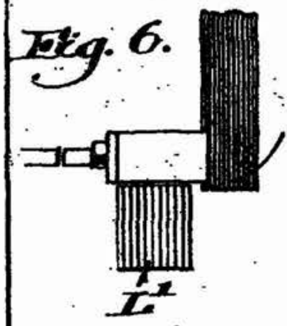
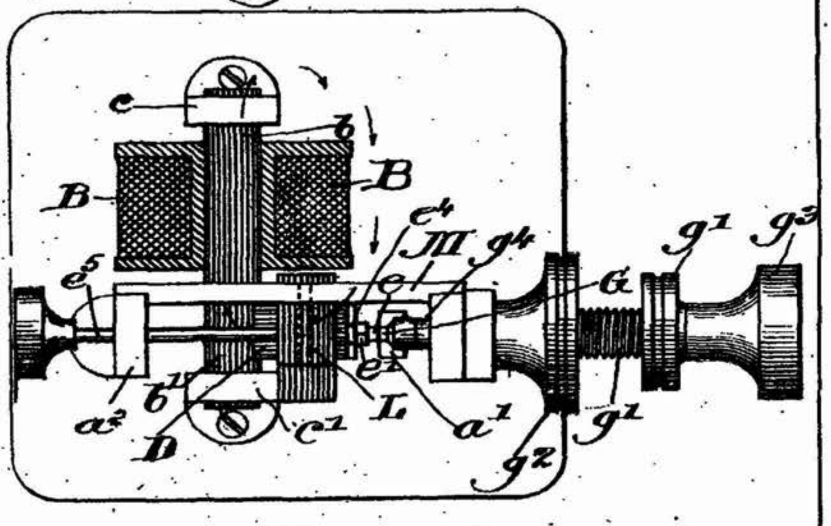


Fig. 2.



c
b
B
B
e⁴
M
g⁴
g¹
g³
e⁵
G
e
e¹
a²
b¹
D
c¹
L
a¹
g²
g¹

Fig. 5.

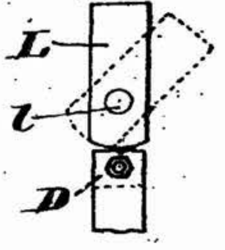
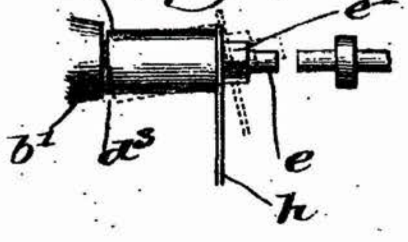
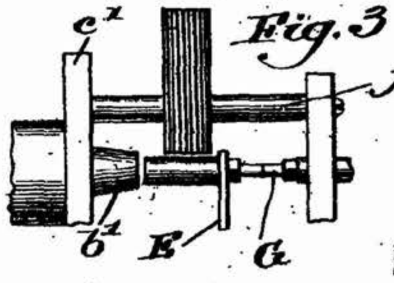


Fig. 7



a²
e¹
b¹
a³
e
h

Fig. 3



[This Drawing is a reproduction of the Original on a reduced scale.]

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Malby & Sons, Photo-Litho.

N° 5518 A.D. 1899

Date of Application, 14th Mar., 1899—Accepted, 8th July, 1899

COMPLETE SPECIFICATION.

Improvements in Electric Spark Gap Apparatus.

I, THOMAS BURTON KINRAIDE, of 38, Spring Park Avenue, Jamaica Plain, in the State of Massachusetts, one of the United States of America, Electrician, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The more recent developments in electrical matters, and particularly in the line of experimental research in connection with static electricity, has developed conditions requiring the discharge of such enormous potentials and amperage as to render the apparatus heretofore provided for such purposes inefficient and largely useless, for the reason that these enormous discharges which the electrician frequently desires to experiment or deal with very quickly render inoperative or destroy such usual apparatus.

Accordingly, it is the object of my present invention to provide a practically indestructible discharge apparatus to meet the more exacting requirements of the present day, and to that end I provide a spark gap which is virtually self-recuperative, and comprises opposite parallel discharge surfaces of considerable area, which, besides their practically indestructible character, possess numerous very important advantages all as will be more fully pointed out in the course of the following detailed description of the apparatus, reference being had to the accompanying drawings illustrative of preferred embodiments thereof.

In the drawings, Fig. 1 represents in side elevation a simple form of my improved spark gap.

Fig. 2 is a similar view shewing a modification.

Fig. 3 is a top plan view of the form of apparatus shewn in Fig. 2.

I provide electrodes preferably in the form of opposite parallel discs g, g^1, the air gap between whose frame surfaces constitutes the spark gap, the extended area of these electrodes preventing the tendency of the condenser (for example) with which my invention will ordinarily be used, to discharge until it has reached its maximum charge, and also causing the discharge to be exceedingly sudden when it does take place, and the discs not being liable to become unduly heated.

The spark gap constitutes virtually a self-recuperative condenser, as it were, the parallel, and preferably plane, metallic surfaces g, g^1, being the discharge surfaces which discharge through or across the intervening air dielectric. The air gap is broken through when the voltage has exerted a sufficient strain upon the air to rupture it. The larger the discs are, the greater condenser capacity will they have, and hence the further apart they will spark.

At each discharge of the condenser a small portion of the plates g, g^1, is oxidized, the successive discharges producing very thin oxidation here and there until the entire surfaces of the two discs are completely oxidised. These discs may be made of copper or other suitable conductor material.

Suitable means is provided for accurately adjusting these plates relatively to each other and regulating their distance apart, or, in other words, for controlling the resistance of the intervening gaseous dielectric, and referring to the drawings, where

[*Price* 8*d*.]

I have shewn a preferred means for accomplishing my object, it will be seen that I provide a plurality of posts g^2 threaded at their upper ends and carrying shouldered nuts g^3 on the shoulders of which is placed the top disc g^1.

The opposite plate g rests on a support or table g^4 and is mounted loosely on a post g^5, being normally held downwardly by a spring g^6 contained in a hanger or housing g^7 depending from the table g^4 said spring bearing at one end against the flanged lower end of the hanger g^7 and at its other end bearing against a washer g^8 retained by a screw g^9 whose head enters a hole or recess in the plate g for centering the latter.

The plate g is provided on its underside with a plurality of recesses or sockets, herein shewn as three in number, which receive props or struts g^{10} projecting upwardly from the base of the instrument.

These props g^{10} are of precisely equal length, so that they support the plate g in absolute parallelism to its opposite plate g^1.

The support g^4 has depending from its lower side a stud g^{11} which is engaged by the bifurcated end g^{12} of a lever g^{13} pivoted at g^{14} to a post g^{15} on its base.

By this provision the most delicate adjustment is possible simply by swinging the lever g^{13} one way or the other so as to incline the struts g^{10} more or less, and thereby increase or decrease the distance between the plates g, g^1, the nuts g^3 being depended upon for the coarser adjustments of the plates.

In Figs. 2 and 3 I have shewn the plates g, g^1, as hollow and provided with water circulation pipes g^{16}, in order that they may be absolutely prevented from all heating under extraordinary conditions.

Under usual conditions, however, this provision is entirely unnecessary, it being sufficient simply to provide the plates as shewn in Fig. 1.

When the adjacent surfaces of the plates have become entirely oxidized, the plates may be turned over and their opposite sides used, and when both sides have become oxidized, they may be readily removed and scoured off without destroying any of their adjustments.

My apparatus makes possible the sudden discharge of a condenser after the latter has reached a certain predetermined point, and said discharge is of great volume or large amperage and of a very sudden and abrupt nature, as the current will not break across the spark gap until it cannot help doing so, and when it does do so the discharge takes place with a minimum heating effect, not interfering with the efficiency, with very rapid and with very short and sharp oscillations incapable of being obtained between a ball or point discharge gap.

The adjustment of the plates relatively to each other regulates the amperage discharge of the instrument being discharged.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A spark gap of the kind described, said spark gap presenting opposite parallel discharge surfaces of relatively large areas, and means for regulating the discharge distance between said parallel surfaces, substantially as described.

2. The herein described spark gap comprising opposite electrodes presenting parallel discharge surfaces, one of said electrodes being supported on three or more struts of equal length, and means for rotating said strut-supported electrode about its centre, whereby its adjustment may be varied to and from the opposite electrode, substantially as described.

3. A spark gap comprising two permanent large superficial areas parallel to each other, constituting opposite discharge surfaces, and an interposed gaseous dielectric, said discharge surfaces having condenser capacity for breaking down the intervening dielectric, and the latter automatically restoring or renewing itself, substantially as described.

4. A spark gap comprising opposite hollow plates or discs having parallel discharge surfaces, means for regulating the discharge distance between said surfaces, and

circulation pipes entering the same, whereby a circulation of water may be maintained for keeping the plates or discs cool, substantially as described.

5. A spark gap comprising three or more posts, shoulders adjustable thereon, a plate or disc supported on said shoulders, a second plate below the same, a support therefor, three or more upright struts loosely engaging said support, and means to rotate said support about its centre, whereby said struts are simultaneously and similarly moved for varying the distance apart of said plates, substantially as described.

6. A spark gap comprising a central post, a plurality of supporting posts, two plates, one carried by said supporting posts and the other adjacent said central post, three or more similar struts supporting said lower plate, a spring maintaining said struts in proper supporting relation, and means to rotate the lower plate on said central post, substantially as described.

7. A spark gap comprising a plurality of supporting posts, two plates, the lower plate being pivotally mounted, three or more similar struts supporting said lower plate, and the upper plate being supported by said supporting posts, a lever pivotally mounted adjacent said lower plate and loosely connected therewith at its inner end for rotating said plate and tipping said struts, substantially as described.

8. A spark gap comprising a central post, a plurality of supporting posts, two plates, the lower plate being pivotally mounted concentrically to said central post, a hanger depending adjacent said post, a spring between said post and hanger and engaging the hanging at its lower end and held by the post at its upper end, three or more similar struts supporting said lower plate, and the upper plate being supported by said supporting posts, a lever pivotally mounted adjacent said lower plate and loosely connected therewith at its inner end for rotating said plate and tipping said struts, substantially as described.

Dated the 14th day of March 1899.

WM. BROOKES & SON,
55 and 56, Chancery Lane, London, Agents for the Applicant.

Redhill: Printed for Her Majesty's Stationery Office, by Malcomson & Co., Ltd.—1899.

A.D. 1899. MARCH 14. Nº 5518.

KINRAIDE'S COMPLETE SPECIFICATION.

(1 SHEET)

Fig. 1.

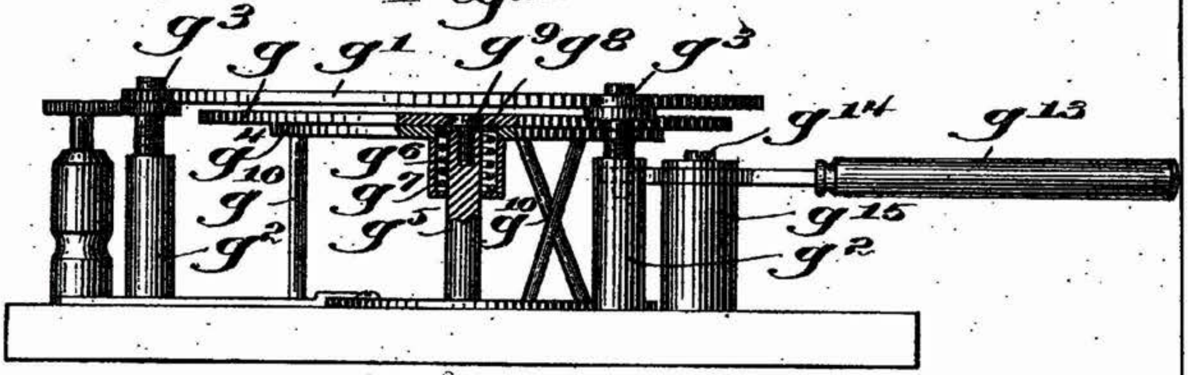
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Fig. 3.

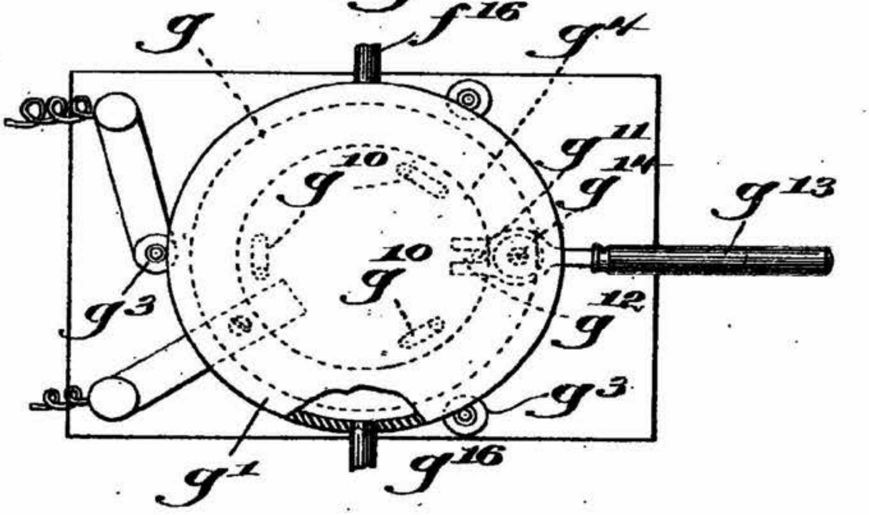
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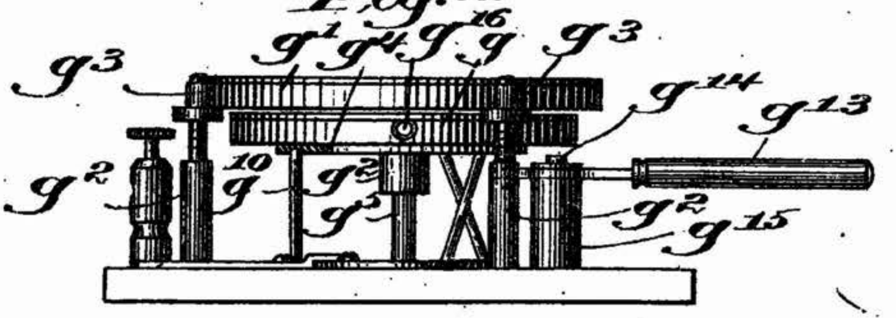
Fig. 2.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g14
g13
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g10
g2
g5
g2
g15

[This Drawing is a reproduction of the Original on a reduced scale.]

Malby & Sons, Photo-Litho.

N° 5519 A.D. 1899

Date of Application, 14th Mar., 1899--Accepted, 15th Apr., 1899

COMPLETE SPECIFICATION.

Improvements in Electric Break Apparatus.

I, Thomas Burton Kinraide, of 38, Spring Park Avenue, Jamaica Plain, in the State of Massachusetts, one of the United States of America, Electrician, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Electric breaks as heretofore provided have been subject to considerable sparking, which is not only destructive of the apparatus but is very objectionable in its effects on the current and system being operated, this being especially true of rotary breaks which operated by means of a brush in frictional engagement with a rotating surface.

Accordingly I have invented a break in which there is no chance for arcing as there is no surface to arc over, and also a leading object of my break is to provide a means for making an exceedingly quick break with a relatively long period of closed circuit, my break rendering it possible to regulate the period of closed circuit accurately.

In the drawings Fig. 1 is a top plan view of one form of my break.

Fig. 2 shows the same in elevation.

On a suitable base D I journal in a central post or bearing d a spindle d^1 of an iron plate or armature d^2, having two or more regions of varying mass of magnetic material, herein shown in the form of eccentric edges d^3, as clearly shown in Fig. 1.

My object is to provide regions of increasing magnetic attraction to cooperate with one or more suitable electro magnets or solenoid devices, so located as to successively attract these regions of varying mass of magnetic material, for rotating the armature, as will now be explained.

Mounted on or otherwise connected to rotate with the armature d^2 are one or more small antifriction rolls d^4, two being herein shown mounted at the opposite ends of a bar d^5 clamped adjustably on the plate d^2.

These rolls or circuit interrupters are preferably of indurated fibre.

Mounted to extend into the path of the rolls d^4 is an arm shown as a wire d^6 carrying a hammer d^7 to contact with an anvil d^8 on a post d^9, and limited in its movement by a fibre stop d^{10} on the end of an adjusting screw d^{11}.

The wire d^6 is carried by a hub d^{12} loose on a pin d^{13} and held under tension by a spring coil d^{14}, Fig. 2, fastened at one end to said hub and at its other end to a nut d^{15} carrying an adjusting or set screw d^{16}; so that by loosening the set screw and swinging its handle one way or the other the resistance of the arm d^6 may be varied.

Preferably adjacent the periphery of the armature d^2, I place attracting means, herein shown in the form of solenoids or electro magnets d^{17}, d^{18}, connected with the main or other source of current by wires d^{19}, which enter the solenoids at their inner terminals, so that as the magnets d^{17}, d^{18} are energised, they attract the armature or plate d^{2}, and by the increasing pull exerted thereon, on account of the eccentric surfaces d^{3}, they cause the plate to rotate with a speed only checked by the striking of the interrupters d^{4} against the end of the arm d^{6}, said rolls being placed relatively to the highest points of the surfaces d^{3}, so that they cut off the current just before said highest points get opposite the propelling magnets, thereby permitting the momentum of the plate or armature d^{2} to carry said highest points beyond the magnets sufficiently to prevent the latter exerting any retarding influence on the rotation of the break.

Preferably I mount the anvil and hammer on a swinging ledge or carrier d^{20}, journaled on the post d, so that I am enabled to regulate the speed of the break simply by swinging the carrier d^{20} one way or the other.

The same effect may be obtained by shifting the roll or rolls d^{4} on the plate d^{2}, provided they are carried, as preferred, on a bar d^{5}, so that they can be shifted.

This adjustment cannot of course take place while the apparatus is in operation, and therefore for instantaneous regulation of the apparatus I provide the swinging carrier d^{20}.

A movement of the carrier from right to left causes the current to be broken before the armature has reached its point of greatest attraction, and as it is moved further toward the left, the pull on the armature exerted by the magnets is diminished more and more, and the speed of rotation of the armature is correspondingly reduced, thereby reducing the number of breaks, and at the same time lengthening the time which the circuit being interrupted is closed.

I place the arm or wire d^{6} slightly tangential to the armature, as will be seen viewing Fig. 1, in order that the rolls d^{4} may strike the extreme end thereof with least friction, striking outward instead of square against the end.

The arm d^{6} is connected to the main or branch therefrom, at d^{21} by means of any suitable conductor d^{22}, and the anvil d^{8} has a connection d^{23} to the delivery end d^{24} of the circuit as will readily be understood.

In operation the magnets being energised attract the eccentric surfaces or other varying masses of magnetic material so as to cause the armature to rotate over to the left, Fig. 1, the circuit being completed at d^{7}, d^{8}, until the very moment when the interrupter d^{4} strikes the free end of the arm d^{6}, whereupon the circuit is instantaneously broken and as this time occurs slightly before the highest points, or places of greatest attraction of the armature, come opposite the solenoids, the latter are rendered inactive merely during the moment when the momentum of the armature is carrying the latter by the solenoids so as to bring the region of least magnetic mass again opposite the solenoids in position for the latter, upon becoming active by the making again of the circuit, to renew their pull upon the armature and thereby continue its rapid revolution.

This action is rapidly repeated at every make and break of the instrument.

I prefer to provide opposite solenoids in order to render the device perfectly balanced and smooth running, although it will be understood that variations in this and in all other details of my invention may be made.

By the use of my invention the time period of closed circuit may be made as considerable as desired.

With any usual break this would be impossible for the reason that in order to give an equivalent period of closed circuit the brush would of necessity remain upon the surface of the break so long as to heat frictionally the surfaces so as to produce a constant arc, ultimately destroying the break as well as the efficiency of the circuit.

In my break there is not only no chance for it to arc, as there is no surface for it to arc over, but the break itself is so exceedingly quick that there is not even a spark at the time of break, but there is merely occasionally a residual spark upon the closing of the break, Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An electric break comprising a rotating member, an electro magnet, a break device, and means driven by said rotating member for interrupting said break device, said rotating member presenting a surface of attraction to said magnet eccentric to the centre of rotation of said member, substantially as described.

2. An electric break comprising a rotating member, an electro magnet, a break device, and means driven by said rotating member for interrupting said break device, said rotating member presenting a surface of attraction to said magnet eccentric to the centre of rotation of said member, and means for varying the time of interruption of said break device relatively to the point of highest attraction of said eccentric surface, substantially as described.

3. An electric break comprising a rotating member, an electro magnet, a spring, a break device, means to vary the resistance of said break device, and means driven by said rotating member for interrupting said break device, said rotating member presenting a surface of attraction to said magnet eccentric to the centre of rotation of said member, and means for varying the time of interruption of said break device relatively to the point of highest attraction of said eccentric surface, substantially as described.

4. An electric break comprising a rotating member having regions of varying mass of magnetic material producing regions of increasing magnetic attraction, an electro magnet adjacent said rotating member, a break device, and an interrupter driven by said rotating member for interrupting the break device, substantially as described.

5. An electric break comprising a rotating member having regions of varying mass of magnetic material producing regions of increasing magnetic attraction, an electro magnet adjacent said rotating member, a break device, and an interrupter carried by said rotating member for interrupting the break device, substantially as described.

6. An electric break comprising a rotating member having regions of varying mass of magnetic material producing regions of increasing magnetic attraction, an electro magnet adjacent said rotating member, a break device, and a pivoted roll carried by said rotating member for interrupting the break device, substantially as described.

7. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electro magnet adjacent said rotating member, a break device, and a pivotted roll carried by said rotating member for interrupting the break device, and means for adjusting said roll on said rotating member, substantially as described.

8. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electro magnet adjacent said rotating member, a break device, and a bar fixed on said rotating member and provided with rolls pivotted thereon at its opposite ends in line with and to interrupt said break device, substantially as described.

9. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electro magnet adjacent said rotating member, a break device, and an interrupter carried by said rotating member for interrupting the break device, said break device being mounted on a carrier movable concentrically to said rotating member, substantially as described.

10. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electro magnet adjacent said rotating member, a break device, and a revolving interrupter driven by said rotating member, said break device including a yielding arm projecting obliquely into the path of said interrupter, substantially as described.

11. An electric break comprising an arm carrying a hammer, an anvil opposite said hammer, said arm being yieldingly supported and provided with means for

regulating the tension or resistance thereof, an interrupter for engaging the free end of said arm, and automatic means operated by the current being broken for driving said interrupter, substantially as described.

Dated the 14th day of March 1899.

WM. BROOKES & SON,
55 & 56, Chancery Lane, London, Agents for the Applicant.

Redhill: Printed for Her Majesty's Stationery Office, by Malcomson & Co., Ltd.—1899

A.D. 1899. MARCH 14. N^o. 5519.

KINRAIDE'S COMPLETE SPECIFICATION.

(1 SHEET)

Fig. 1.

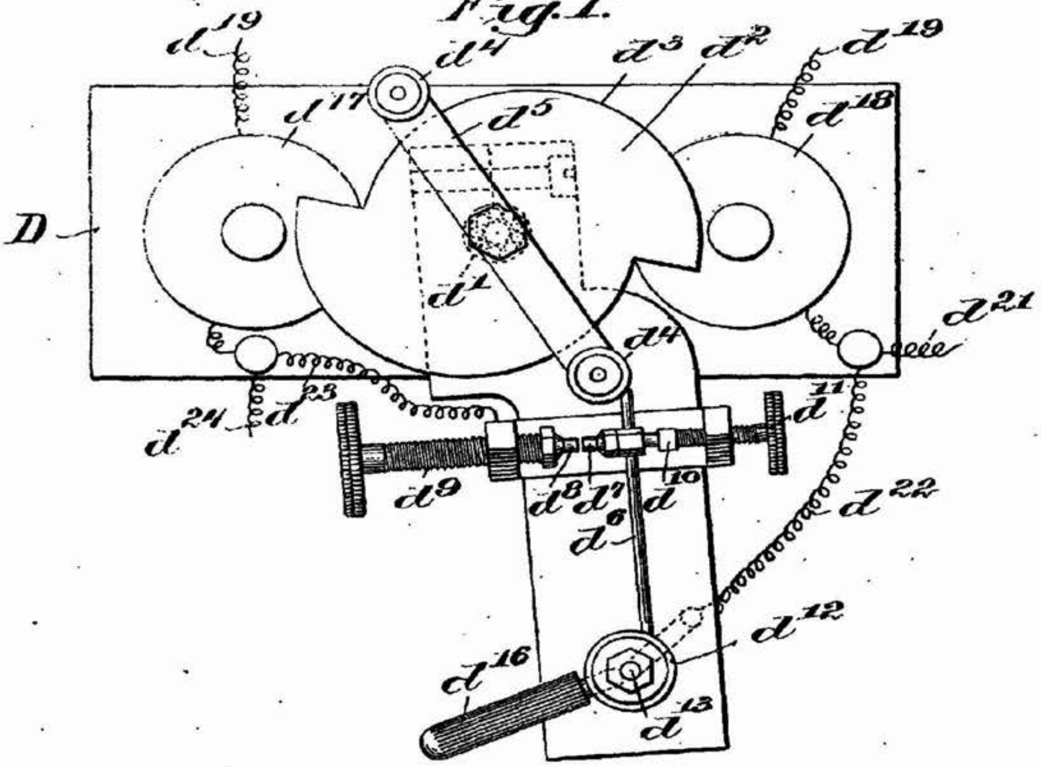
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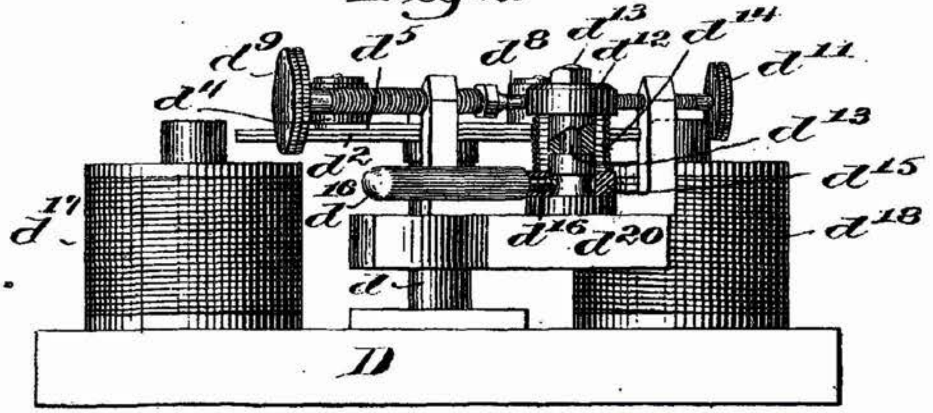
Fig. 2.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Malby & Sons, Photo-Litho.

Nº 12,408 A.D. 1901

Date of Application, 18th June, 1901—Accepted, 20th July, 1901

COMPLETE SPECIFICATION.

Improvements in and relating to Static Rectifiers and other Electrical Apparatus for Producing or Maintaining Continuous or Unidirectional Discharges

I THOMAS BURTON KINRAIDE, of 38 Spring Park Avenue, Boston, State of Massachusetts, one of the United States of America, Electrician, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention is shown as embodied in an electrical machine of the kind known as static rectifiers, but the invention considered in its broader features is not restricted to this particular electrical machine, but is of wide application to various kinds of electrical apparatus, and embodies certain important discoveries which I have made, whereby I am enabled to positively maintain an electrical discharge in one direction only, and under proper conditions to maintain said discharge continuously, producing, for instance, without the intervention of a commutator, a continuous current, directly from an alternating or intermittent current.

Without necessarily stating that such is the fact, it may be supposed that there is simply electrical energy and that the presence of said energy is what we call a positive condition, and the absence of said energy is what we call a negative condition, and this, taken with my discovery that electric energy in its positive condition discharges reluctantly from a plane (without edges, or angular or pointed surfaces) and discharges with perfect freedom from a point, enables me to control the direction of discharge of the current and hence the accumulation of potential.

The requisite conditions are provided by means of what I term an extensionless point which provides, as nearly as it can be done mechanically, the ideal discharge electrode or positive condition for the outward flow of the electrical energy, and by means of what I term a limitless plane which provides in the same manner the receptive electrode or negative condition in which there may be said to be an absence of energy (or a lower potential than that of the point from which the discharge comes), analogous to a vacuous condition or absence of electrical pressure.

By this means, the electrical energy tends to discharge continuously in one direction only, *viz*: from the extensionless point to the limitless plane.

I have applied my invention in various ways, as, for instance, in a static machine in which the receiving electrode has an extended plane surface or large flat area of the limitless plane type and the discharge electrode has a point discharge or preferably a series of points like a usual cone; but for the purposes of fuller explanation of my invention as well as being covered by certain of the claims in this application, I have illustrated my invention more elaborately in an electrical apparatus for producing unidirectional discharges of high potential.

In the drawings Fig 1 is a view, partly in perspective and largely diagrammatic, of one form of machine embodying my invention;

Fig 2 is a vertical cross-sectional view showing the most approved form of two of the cooperating electrodes;

Fig 3 illustrates the application thereof for transforming an intermittent current into a constant current;

[*Price* 8*d*.]

Fig 4 illustrates the application of my invention to Leyden jars for converting an intermittent discharge into a continuous discharge.

Referring now more particularly to Fig 2, in order that the foundation idea of my invention may be first clearly understood, it will be seen that the electrode *a* is pointed or pencil shaped and that the extreme discharge point *b* is in or projected slightly through a small aperture *c* in a rubber or other flat disc *d* which extends at right angles thereto, the purpose of this disc being to cut off the attracting area which would otherwise be present in the converging walls or surfaces of the electrode *a*.

By this means I provide an extensionless point, speaking electrically. By this term, I mean a point in which the attractive area of the electrode relatively to the opposite electrode is limited to the point itself or, in other words, in which the rubber disc *d* shields all the surface of the rod or electrode behind the very point thereof.

The rubber disc constitutes means for cutting off the receptive area about the discharge point.

Opposite the electrode point *b* is the receptive electrode *e* which maintains a negative condition relatively to the electrode *a*, and which I have termed the limitless plane, speaking again electrically, this electrode having a large receptive area and being provided with means for preventing the tendency to discharge, said means residing in presenting a receptive surface or plane without angles or points, and this plane is secured by providing a flat surface *f* of considerable relative extent and curving its edges back and inwardly as indicated at *g*, whereby, viewed electrically, the surface is limitless inasmuch as it has no termination within the influence of the discharge point *b*.

In operation, the positive energy discharges invariably from the point *b* to the plane *f* and there is no discharge from the latter back to the point, one reason therefor being that the attraction of the limitless plane is compelling, there being practically no attraction in the opposite direction, due to the shielded point.

From the foregoing the extensionless point and limitless plane feature, which is at the basis of my invention, will be readily understood, and it will be seen that its field is important and large.

For example, in Fig 3 I have indicated a typical source of intermittent or alternating energy in the form of an induction coil *h* (operated by an alternating current) whose terminals *i*, *j*, are provided with electrodes *a*, *e*, of the kind already described, and opposite these electrodes which are arranged in pairs are complementary electrodes *e a*, connected to a working circuit *k* which it is desired shall have a continuous current.

Remembering that, as already explained, the extensionless point and limitless plane electrodes compel the discharge to take place in one direction, it will be seen that the intermittent or alternating discharge from the coil *h* is automatically transferred into a continuous current by the lower sets of electrodes as arranged in Fig 3.

Referring now to Fig 1, where I have shown a more complete machine constructed to employ my invention in an elaborate manner, I have mounted on suitable insulating posts 2 a series of these electrodes *a*, *e*, arranged in opposite sets, there being herein shown three pairs in each set, on opposite sides of the machine.

On the right hand side of the machine the point electrodes are mounted in a rail 3 and screened by a shield 4 (although they may be screened by any other suitable means, as may be convenient, and, in fact, the machine will operate to advantage for some purposes without any screen), and the plane electrodes are mounted in a conductor rod 5, while on the opposite side of the machine the arrangement is reversed, the plane electrodes *e* being mounted in the rail 3, and the point electrodes in the rod 5.

In a suitable position, herein shown as the end of the right hand rod 5, is mounted a point electrode a^1, and opposite thereto mounted in the opposite rod 5 is a plane electrode e, while suitably connected thereto is any form of apparatus with which it may be desired to use the machine, herein shown as a condenser 6 connected by wires 7, 8, to the conductor rods 5.

On the base or table 9 are carried a plurality of high potential generating units, as they may be called, herein shown as usual induction coils 10, 12, 13, the terminals of whose secondaries are connected respectively to the lower set of electrodes immediately above them, as is clearly shown, and whose primaries are connected to a battery or other current source 14, an interrupter m being interposed in the circuit and a series of condensers 15, 16, 17, being properly interposed.

The condensers may be thrown into the circuit, as may be desired, by switches n, n^1, n^2.

While the machine will work with other forms of interrupters, yet for the best efficiency thereof I have found it necessary to employ a special interrupter consisting of a cup m^1 provided with a quantity of mercury m^2, above which is a bath of kerosene oil m^3.

A fixed conductor m^4 from the interrupter m leads into the mercury, and above the same is arranged a series of plungers or contact makers m^5, m^6, m^7, connecting respectively with the several high potential units 10, 12, 13, and operated by a shaft m^8 driven by any suitable means, as by a motor m^9, belt m^{10} and pulley m^{12}.

On the shaft m^8 are eccentrics m^{13} relatively adjustable by means of set screws m^{14}.

I have described my mechanism in all its preferred details of construction, as herein embodied, but it will be understood that many changes and substitutions may be resorted to without departing from the spirit and scope of my invention, and that the form and general make up of the apparatus will usually be modified to conform to the particular situation and purpose for which it is intended.

The operation is as follows When quantitative effect of discharge is desired, the interrupter is set as shown, the eccentrics all being placed the same, so that the coils are all broken simultaneously, the coils being in multiple, and thereby the lower electrodes a at the right hand, simultaneously discharge their respective coils, and this combined discharge is received by the opposite electrodes e and conveyed by the conductor 5, thereby giving an enormous discharge from the point a^1 to the receiving electrode e^1, the circuit being completed therefrom through the upper electrode a to the electrode e, and meanwhile the condenser 6 is charged, according to its capacity.

If, on the other hand, continuity of discharge is desired, the eccentrics m^{13} are adjusted in step with each other, so that the interruptions in the mercury cup are made dissimultaneously, or in succession, thereby discharging the coils 10, 12, 13, successively, and hence producing a continuous discharge between the electrodes a^1, e^1, this discharge being at a given voltage, according to the capacity of the condenser 15, 16, 17, or such part thereof as may be used.

By having a plurality of induction devices or high potential generators arranged in step in connection with the point and plane electrodes, I am enabled to obtain a continuous discharge, yet employ a slow interruption, the result being that a maximum output is made certain.

This result has not heretofore been feasible, as it would be necessary to operate the interrupter with great rapidity in order to get the high potential required, and when the interruptions of a coil are exceedingly rapid the output from the secondary, as is well known, is below its capacity.

This invention makes possible obtaining a purely direct discharge, *i.e.*, free from oscillations, such as has heretofore been obtained only from a static machine; accomplishes the handling or control of any quantity, however great, of high potential current; is a most powerful generator for X-ray work, and ideal in its control of the quality of X-rays, on account of the discharge being wholly in one direction, continuous, and from a condenser; besides various other advantages which will occur to those skilled in the art.

In Fig 4 I have illustrated my electrode invention applied to two Leyden jars 18 having their outer coatings electrically connected by a wire 19 and their inner coatings connected by posts *p* in which are mounted usual discharge rods *r*, said posts, however, being provided on their upper extremities with the electrodes *a*, *e*; opposite to electrodes *e*, *a*, at the terminals of a coil *h* (operated by an interrupted current).

By this means, it is possible to maintain constant discharge at an approximately fixed potential similar to the discharge from a static machine, as the intermittent discharge from the induction coil which is the source of supply for the Leyden jars, is enabled to keep the Leyden jars at a practically saturated point, so that the latter can maintain a constant discharge between their rods *r*.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. The herein described means for producing a continuous or unidirectional discharge, consisting of electrodes one of which has a discharge point and is provided with means for cutting off the receptive area about said point, and another of which has a large receptive area provided with means for preventing the tendency to discharge, as set forth.

2. An electrode terminating in a plane conducting surface, having its edges curved or rolled rearwardly and inwardly.

3. An electrode terminating in a comparatively fine point, and a flat shield extending approximately at right angles to said electrode and having a small aperture in which said point is located.

4. In an electrical apparatus, a source of intermittent electrical energy having at its opposite terminals electrodes one of which has a discharge point provided with means for cutting off the receptive area about said discharge point and the other of which has a large receptive area provided with means for preventing the tendency to discharge, said means residing in presenting a receptive surface without angles or points, and other electrodes cooperating with said terminal electrodes, there being a discharge point electrode arranged to cooperate with a receptive area electrode and *vice versa*.

5. An electrical apparatus, comprising a plurality of high potential generating units, and means uniting them in a unidirectional discharge.

6. An electrical apparatus, comprising a plurality of high potential generating units, means for giving them a unidirectional discharge, and mechanism for discharging them simultaneously or dissimultaneously, as desired.

7. An electrical apparatus, comprising a plurality of induction coils whose secondaries have at one end a point electrode, and at the other end a plane electrode, cooperating electrodes therefor, and a condenser and interrupter in the circuit of the primaries of said coils, said interrupter comprising a mercury cup having a series of movable contact makers movable in oil above said mercury

8. An electrical apparatus, comprising a plurality of induction coils whose secondaries have at one end a point electrode, and at the other end a plane electrode, cooperating electrodes therefor, a condenser and interrupter in the circuit of the primaries of said coils, said interrupter comprising a mercury cup having a series of movable contact makers movable in oil above said mercury, and means for varying the movement of said contact makers with relation to each other.

9. An electrical apparatus comprising a plurality of induction coils whose secondaries have at one end a point electrode, and at the other end a plane electrode, cooperating electrodes therefor, a condenser and interrupter in the circuit of the primaries of said coils, said interrupter comprising a mercury cup

having a series of movable contact makers movable in oil above said mercury, said condenser having a plurality of independent parts, and switching mechanism for throwing said parts independently into the circuit of said primaries.

Dated the 18th day of June 1901.

WM. BROOKES & SON,
55 & 56 Chancery Lane London
Agents for the Applicant

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Fig. 1.

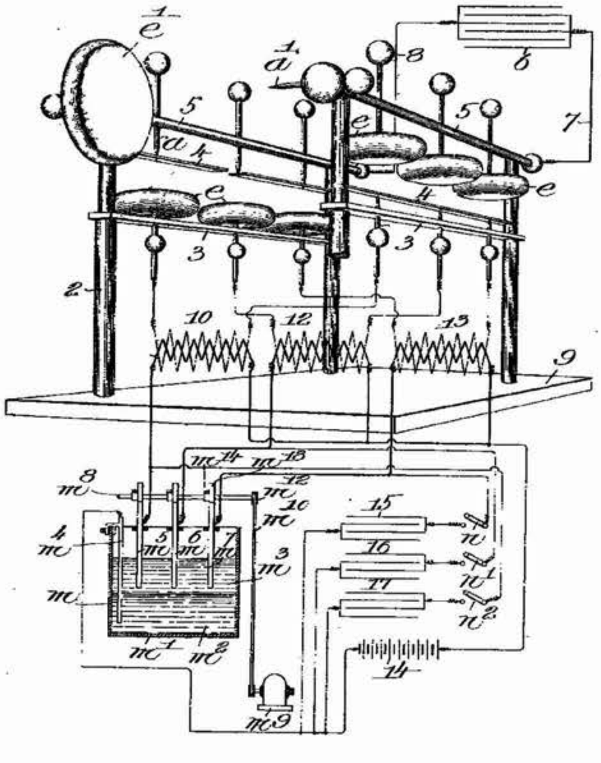
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Fig. 2.

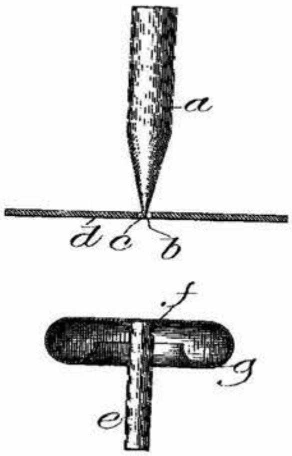

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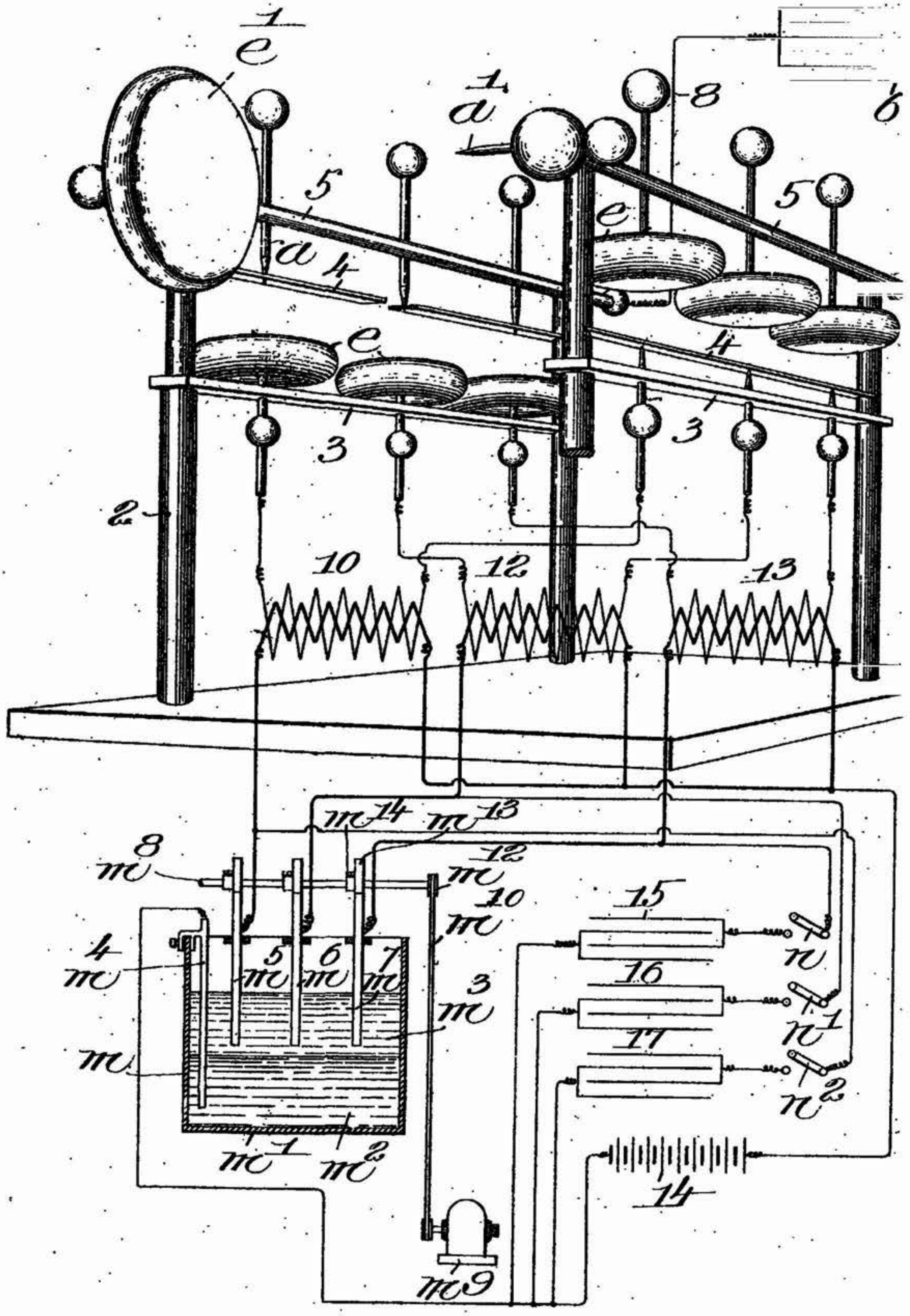
Fig. 1.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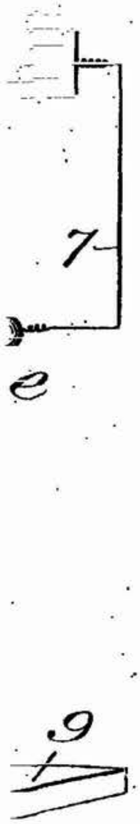

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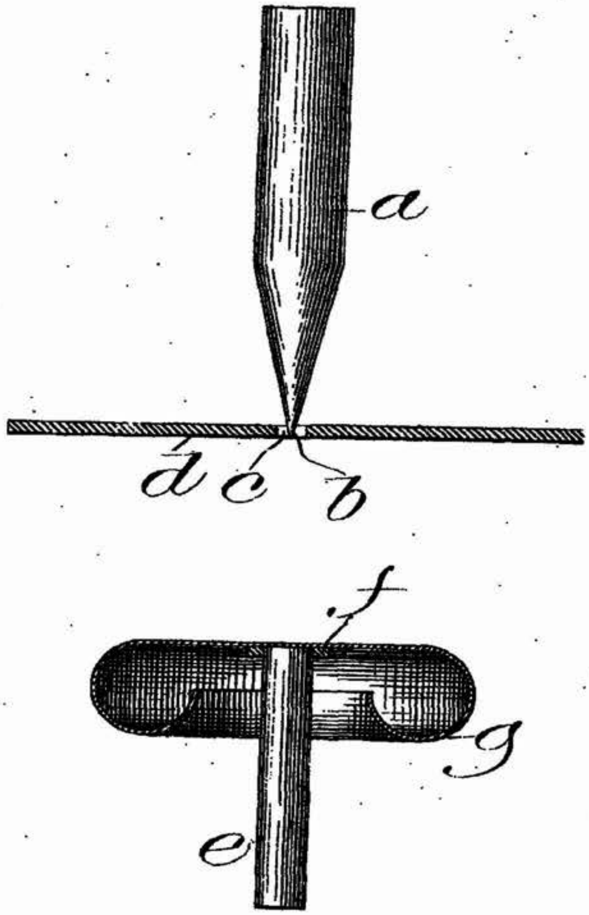
SHEET 2

Fig. 2.



[This Drawing is a reproduction of the Original on a reduced scale]

Malby&Sons, Photo-Litho.

Fig. 3.

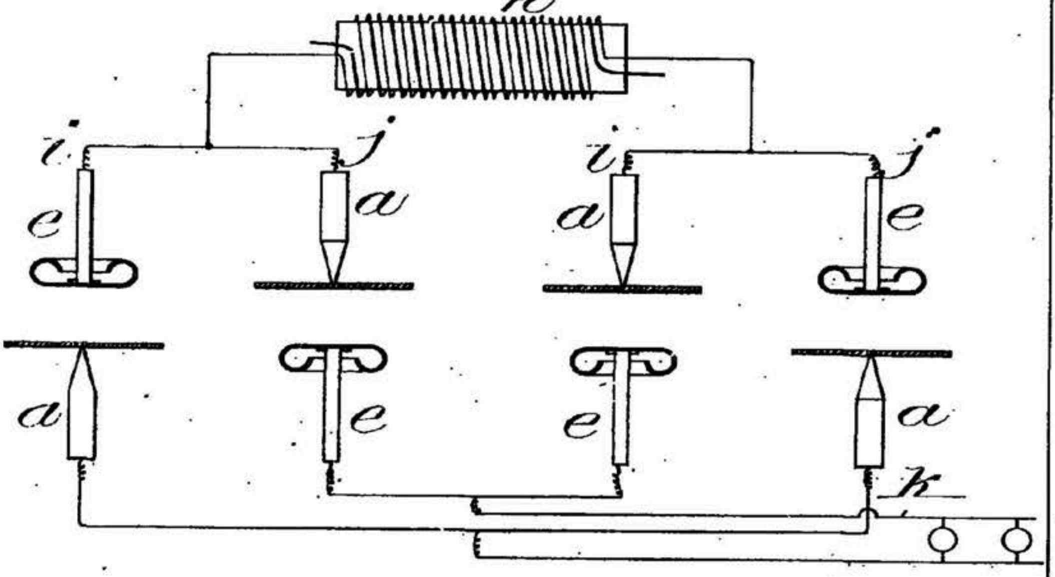
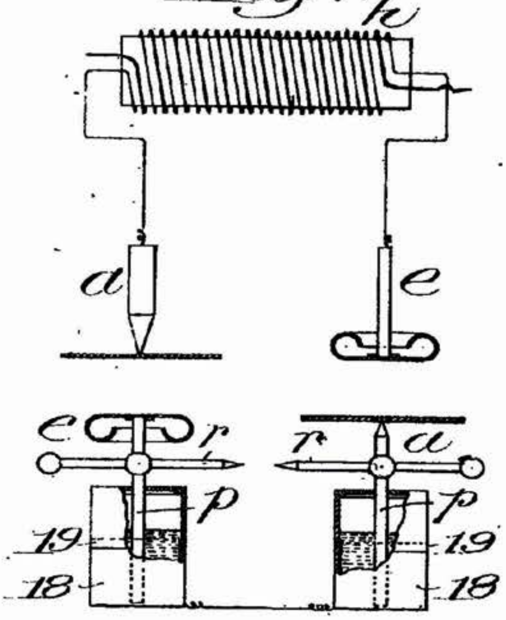

h
i
j
i
j
e
a
a
e
a
e
e
a
k

Fig. 4.


h
a
e
e
r
r
a
p
p
19
19
18
18

[This Drawing is a reproduction of the Original on a reduced scale.]

Malby & Sons, Photo-Litho.

Eigenthum des Kaiserlichen Patentamts.

KAISERLICHES PATENTAMT.

AUSGEGEBEN DEN 2. MÄRZ 1900.

PATENTSCHRIFT

— № 108924 —

a. Gruppe 6

KLASSE 21: Elektrische Apparate und Maschinen.

THOMAS BURTON KINRAIDE in JAMAICA-PLAIN (Mass., V. St. A.).

Vorrichtung zur Erzeugung elektrischer Entladungen.

Patentirt im Deutschen Reiche vom 21. März 1899 ab.

Die neuerliche Entwickelung auf elektrischem Gebiet, insbesondere in Richtung der experimentellen Arbeit mit statischer Elektricität erfordert Entladungen von solch enormem Potential bezw. Mengen aufgespeicherter Elektricität, daſs die üblichen Vorrichtungen, indem sie sehr rasch unwirksam werden oder der Zerstörung unterliegen, unzureichend geworden sind.

Dieser Uebelstand wird der vorliegenden Erfindung gemäſs beseitigt durch die Verwendung des bekannten Kohlrausch'schen Plattencondensators als Funkengeber zur Erzeugung oscillirender Entladungen, d. h. es wird die Entladung bewirkt vermittelst zweier unter Belassung eines Funkenraumes streng parallel zu einander angeordneten Flächen von groſser Ausdehnung.

Die Erfindung ist in zwei Beispielen in den beiliegenden Zeichnungen veranschaulicht.

Fig. 1 zeigt in Seitenansicht eine sehr einfache Ausführungsform und

Fig. 2 in gleicher Darstellung eine mit Kühlvorrichtung für die Entladungsplatten versehene Abänderung; Fig. 3 ist die Oberansicht zu Fig. 2.

Die Entladungselektroden bestehen aus den metallenen Platten oder Scheiben $g\,g^1$, welche, mit möglichst ebener Oberfläche versehen, streng parallel zu einander angeordnet sind; der Luftraum zwischen den Platten bildet den Funkenraum. Je gröſser die Scheiben sind, um so gröſsere Condensatorcapacität besitzen sie, und durch einen um so weiteren Zwischenraum lassen sie Funken überschlagen.

Die Scheiben bezw. Platten $g\,g^1$ sind behufs Aenderung des Widerstandes des zwischengeschalteten gasförmigen Dielektrikums verstellbar gemacht. Aus den Zeichnungen, in denen die hierzu vom Erfinder angewendete Einrichtung veranschaulicht ist, ersieht man, daſs eine Anzahl Säulen g^2 angeordnet ist, auf deren obere mit Gewinde versehene Enden Muttern g^3 geschraubt sind mit Schultern zum Aufsetzen der oberen Scheibe oder Platte g^1.

Die Gegenscheibe g ruht auf einer Unterlage oder einem Tisch g^4; sie ist lose in einem Säulchen g^5 gehalten und wird für gewöhnlich gegen ihre Unterlage gezogen durch eine Schraubenfeder g^6, welche in einem von der Unterlage herabhängenden Gehäuse g^7 angeordnet ist. Diese Feder g^6 stützt sich mit dem unteren Ende gegen den Boden des Gehäuses und mit dem oberen Ende gegen eine Scheibe g^8, welche durch eine Schraube g^9 festgehalten ist, deren Kopf in der Scheibe g zur Centrirung derselben versenkt ist. Die Scheibe g ist auf der Unterseite mit einer Anzahl, auf der Zeichnung z. B. drei, Vertiefungen versehen zur Aufnahme der oberen Enden von Stützen g^{10}. Letztere sind von genau gleicher Länge, so daſs sie die Scheibe g absolut parallel zur Gegenscheibe g^1 halten. Von der Unterseite der Unterlage g^4 ragt nach unten ein Zapfen g^{11} (Fig. 3), welchen das gegabelte Ende g^{12} eines Hebels g^{13} umfaſst, der in g^{14} drehbar auf einer Säule g^{15} gelagert ist. Infolge dieser Einrichtung ist die genaueste Einstellung in einfacher Weise ermöglicht, indem man durch Drehen des Hebels (nach der einen oder anderen Seite) den Stützen g^{10} eine gröſsere oder geringere Neigung ertheilen und dadurch den Abstand zwischen den Scheiben $g\ g^1$ entsprechend vergröſsern und verringern kann. Die Muttern g^3 dienen gröberer Einstellung durch Heben oder Senken der oberen Scheibe.

In den Fig. 2 und 3 sind hohle Scheiben $g\ g^1$ in Verbindung mit Wassercirculationsröhren g^{16} gezeigt, um jeder Erwärmung unter auſsergewöhnlichen Umständen begegnen zu können. Für gewöhnliche Umstände ist diese Vorkehrung völlig überflüssig.

Sind die Scheiben auf den Entladungsflächen vollständig oxydirt, so kann man sie umwenden und die Kehrseiten als Entladungsflächen benutzen. Sind auch diese oxydirt, so kann man die Scheiben leicht herausnehmen und blank machen, ohne eine ihrer Einstellungen zu zerstören.

Die Erfindung ermöglicht unter Entwickelung von nur wenig Wärme die jähe Entladung eines Condensators bei Erreichung einer bestimmten Ladung unter Erzeugung von Oscillationen, wie sie mit gleicher Rapidität, Kürze und Schärfe vermittelst der Entladung zwischen Kugel und Spitze nicht erzielbar sind.

PATENT-ANSPRÜCHE:

1. Eine Vorrichtung zur Erzeugung elektrischer Entladungen, gekennzeichnet durch die Verwendung des Kohlrausch'schen Plattencondensators als Funkengeber.
2. Eine Ausführungsform der unter 1. geschützten Vorrichtung, bei welcher eine der Entladungsoberflächen von drei oder mehr Stützen von gleicher Länge getragen wird, welche so angeordnet sind, daſs sie zur Regelung des gegenseitigen Abstandes der Entladungsflächen zusammen geneigt werden können.
3. Eine Ausführungsform der unter 1. geschützten Vorrichtung, bei welcher die Entladungsoberflächen mit Circulationsvorrichtung behufs Durchleitung von Kühlwasser versehen sind.

Hierzu 1 Blatt Zeichnungen.

BERLIN. GEDRUCKT IN DER REICHSDRUCKEREI.

THOMAS BURTON KINRAIDE in JAMAICA-PLAIN (Mass., V. St. A.).

Vorrichtung zur Erzeugung elektrischer Entladungen.

Fig. 1.

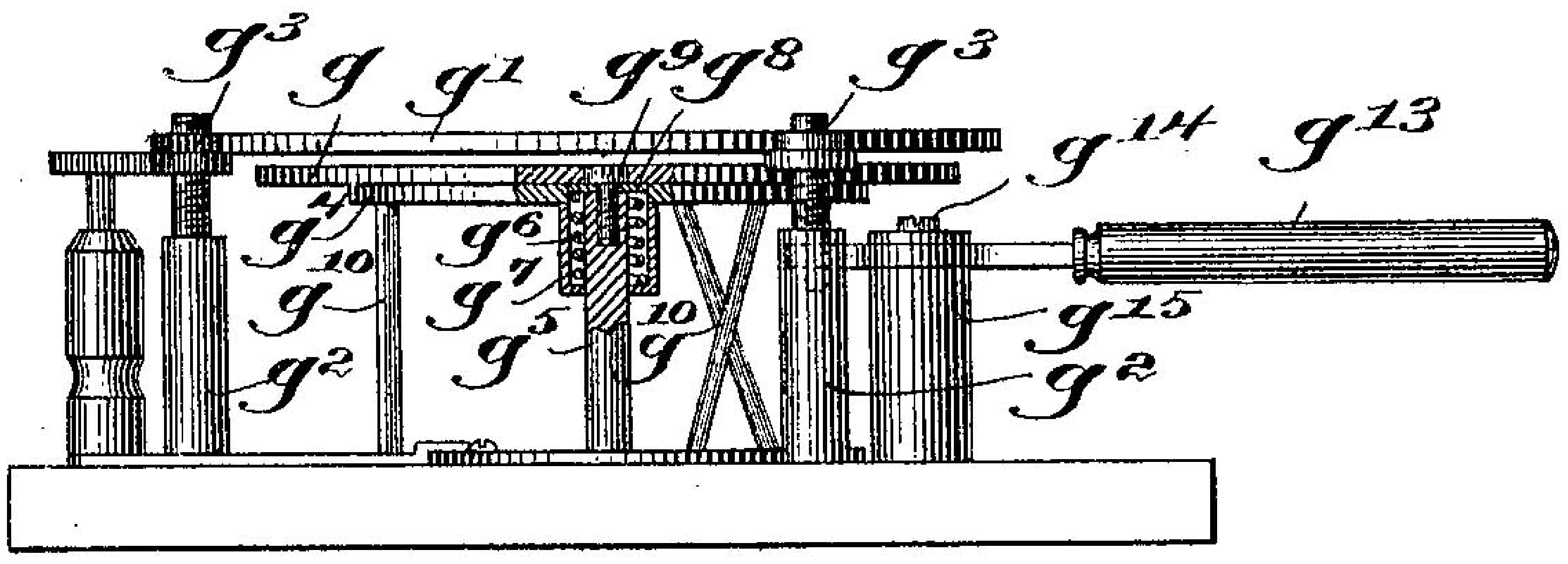

g^3
g
g^1
g^9
g^8
g^3
g^{14}
g^{13}
g^4
g^{10}
g
g^6
g^7
g^5
g^{10}
g^{15}
g^2
g^2

Fig. 3.

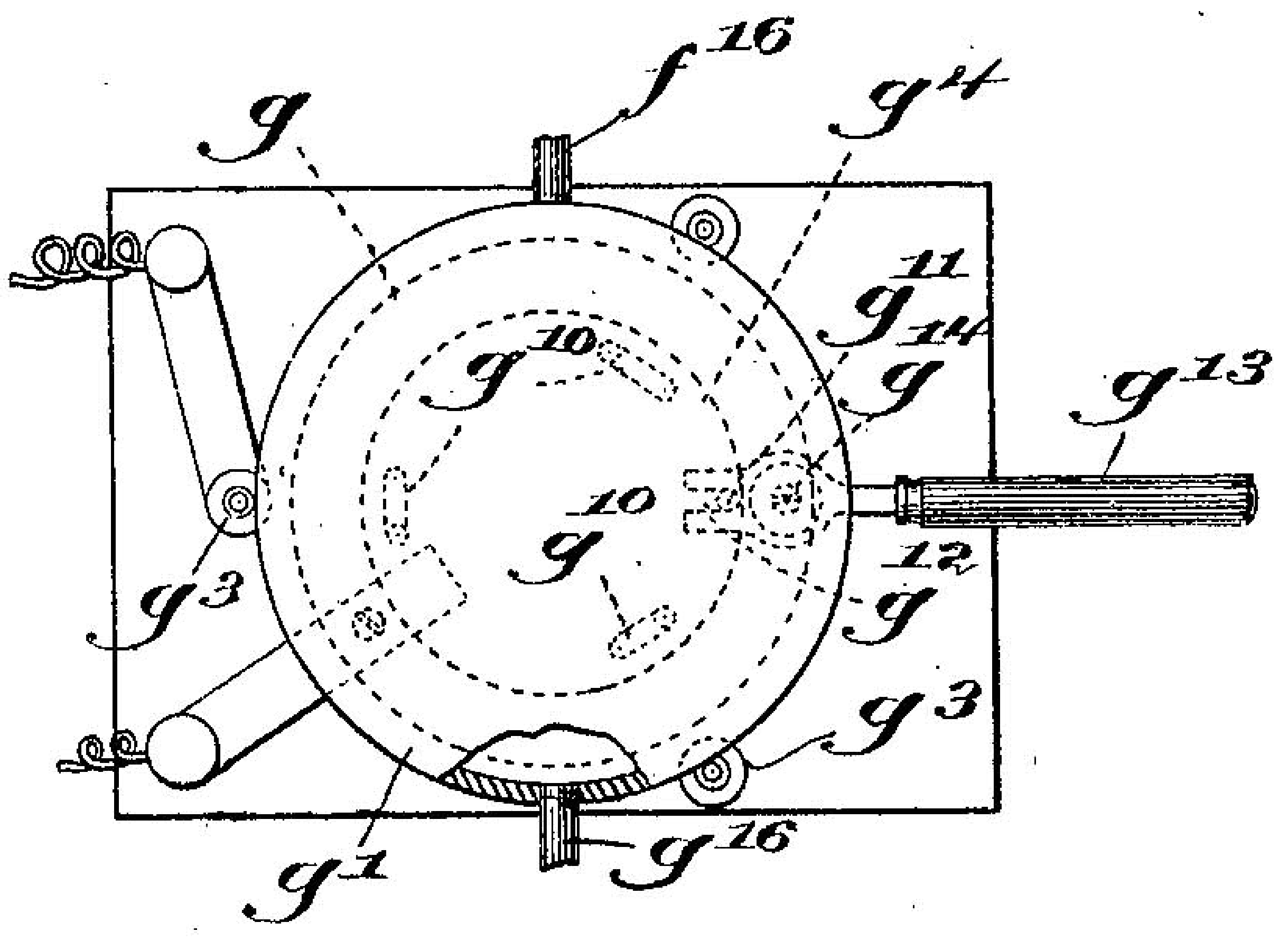
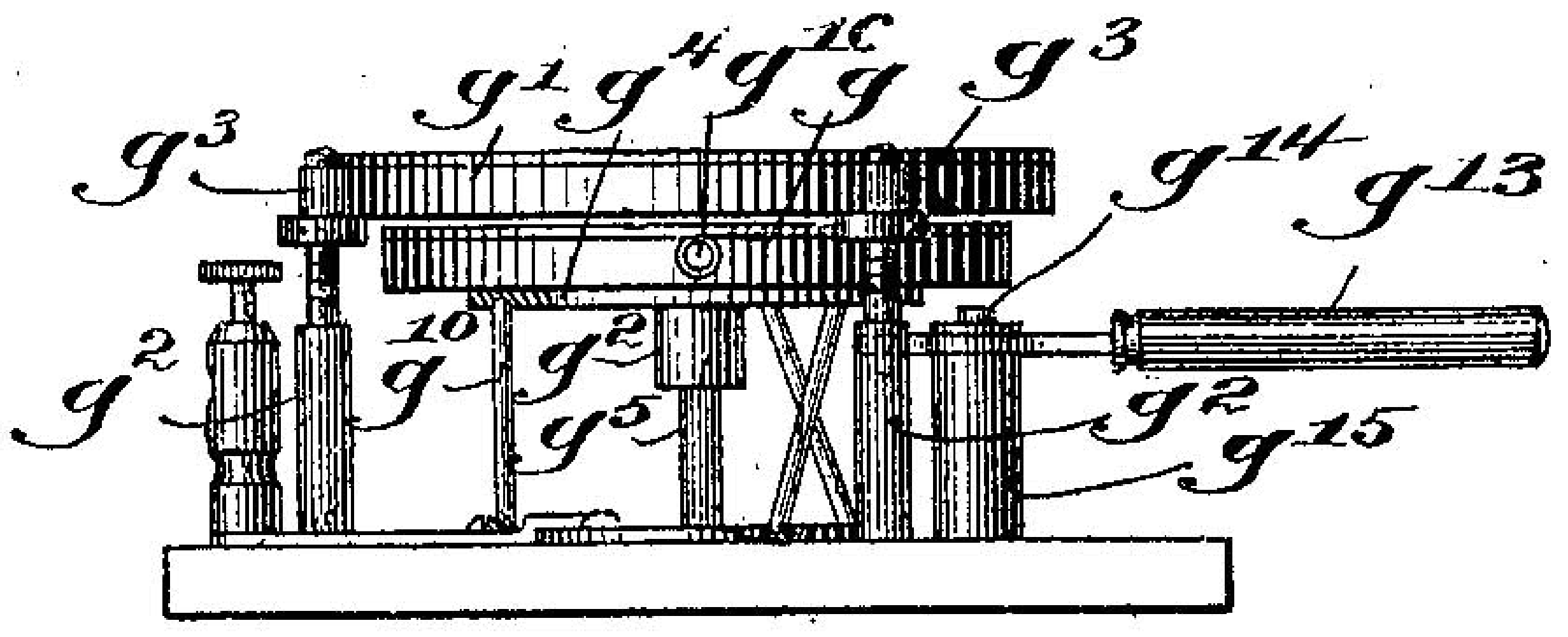

g
f^{16}
g^4
g^{11}
g^{14}
g^{13}
g^{10}
g^{10}
g^{12}
g^3
g^3
g^1
g^{16}

Fig. 2.


g^3
g^1
g^4
g^{10}
g
g^3
g^{14}
g^{13}
g^2
g^{10}
g^2
g^5
g^2
g^{15}

Zu der Patentschrift

№ 108924.

PHOTOGR. DRUCK DER REICHSDRUCKEREI.

No. 615,652. Patented Dec. 6, 1898.

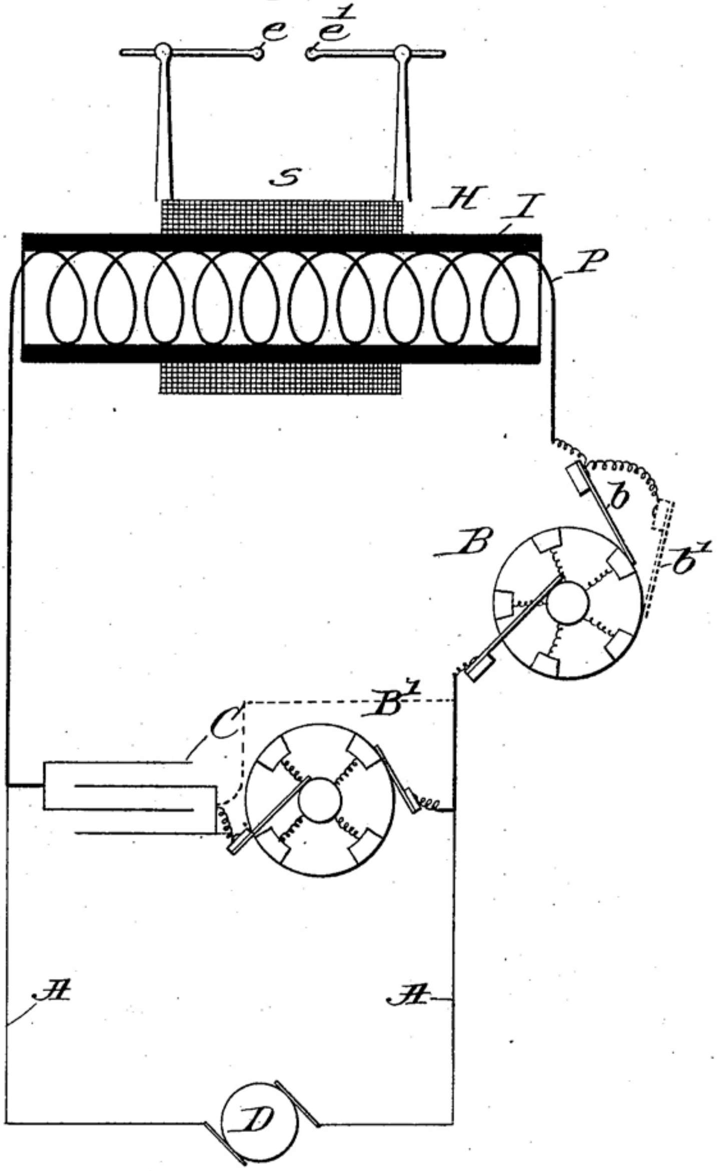
T. B. KINRAIDE.

HIGH FREQUENCY APPARATUS.

(Application filed May 13, 1897.)

(No Model.) 2 Sheets—Sheet I.

Fig. 1.



Witnesses:
Fred S. Greenleaf.
Thomas J. Drummond.

Inventor:
Thomas B. Kinraide.
by Crosby & Gregory
attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 615,652. Patented Dec. 6, 1898.

T. B. KINRAIDE.

HIGH FREQUENCY APPARATUS.

(Application filed May 13, 1897.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

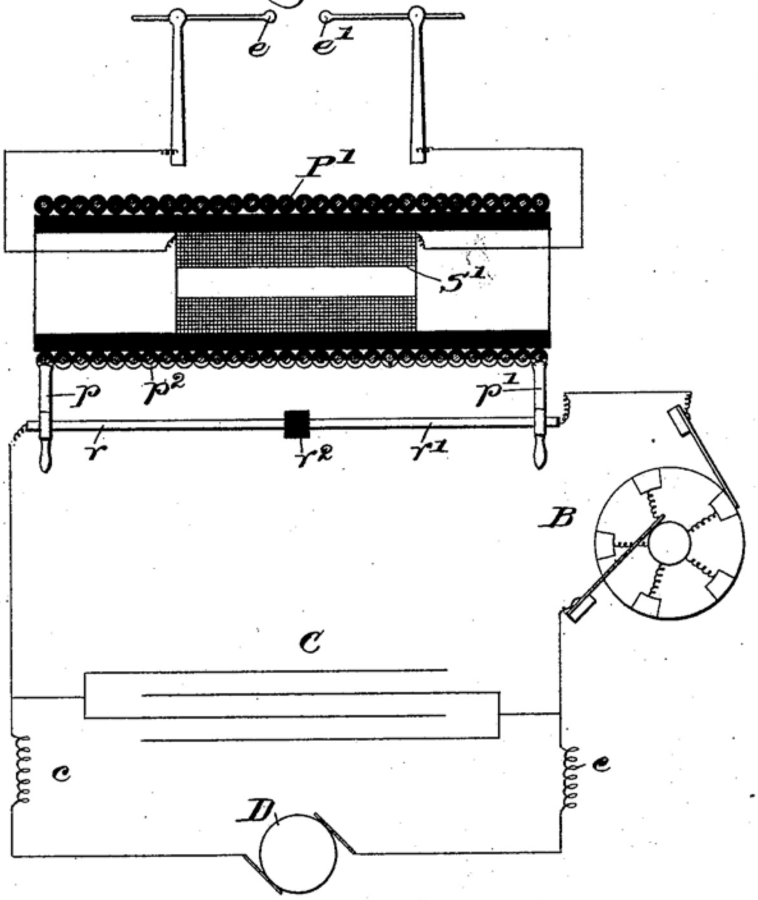
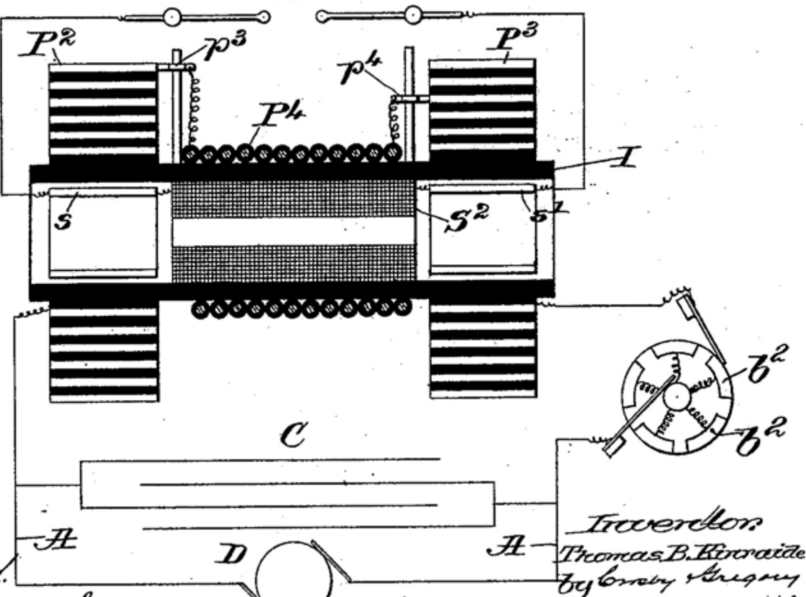

e
e1
P1
S1
p
p2
p1
r
r2
r1
B
C
c
c
D

Fig. 3.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p3
P3
p4
P4
I
s
S2
s1
b2
b2
C
A
A
D

Witnesses:
Fred S. Greenleaf.
Thomas J. Drummond

Inventor.
Thomas B. Kinraide.
by Crosby & Gregory
attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

HIGH-FREQUENCY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 615,652, dated December 6, 1898.

Application filed May 13, 1897. Serial No. 636,293. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in High-Frequency Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to oscillators or high-frequency coils, having for its object the provision of compact apparatus of enormous rapidity and comparatively light weight and bulk especially adapted for work with X-rays.

The details of my apparatus will be more fully apprehended in the course of the following description, taken in connection with the accompanying drawings, illustrative thereof, and the invention will be more fully defined in the appended claims, forming a part of this specification.

In the drawings, Figure 1 shows diagrammatically one embodiment of a simple form of apparatus for carrying out my invention. Figs. 2 and 3 are similar views showing further features of the invention.

A A designate a circuit from a suitable source of electricity, herein shown as a dynamo D, this circuit being any usual commercial circuit or branch from a usual street-main or any other source of energy and leads directly, without any intervening apparatus, to a condenser C of small capacity.

The condenser is connected at either end (the right-hand connection being indicated by dotted lines, Fig. 1) to a coarse primary P, preferably having a single winding of a high-frequency coil H, a break B being interposed in the circuit, this break being shown as a commutator, although any other high-speed interrupter may be employed.

From the above description it will be understood that the dynamo is in direct circuit with the condenser, giving the latter a continuous primary charge, which is constantly piled up in the condenser; but the relatively coarse wires of the coil-circuit, the circuit being completed with great rapidity by the high-speed break, tend constantly to discharge the condenser, and this is accomplished and without any excessive raising of the potential thereby, so that the potential of the coil depends almost altogether upon the fluctuations of the condenser for its intensity.

The fluctuations in the oscillator or coil are exceedingly high, for the reason that the break is run at a very high speed and the secondary is tuned thereto, being of relatively few turns, as already stated, the result being that there is a very powerful sparking from the electrodes e e', and yet the potential of the coil is not so high as in the oscillators at present employed, and therefore no oil insulation is required. This is a great desideratum in this apparatus, for the reason that the oil insulation has proved a very serious obstacle in practice.

In order to increase the efficiency of the apparatus still more, I prefer to construct the break or otherwise provide it with means whereby the intervals between the interruptions thereof may be proportioned to the time-constant of the circuit, and for this purpose I have indicated in dotted lines in Fig. 1 an adjustable brush b', movable relatively to what I may term the "main" brush b, (shown in full lines,) these brushes being adjusted so that the two brushes shall both rest together on an insulation before the contact is again completed, the periods of contact between said interruptions being readily proportioned, as stated, by this means, so as to correspond to the time-constant of the circuit, or instead of the adjustable means shown in Fig. 1 and just described I may build the commutator, if that kind of interrupter be used, so that it shall be definitely proportioned originally as desired, this construction being indicated in Fig. 3, where the contact-segments b^2 are shown as having considerable peripheral area, so as to increase the period of contact of the brush to correspond to the time period of the circuit. This feature of my invention produces greatly-improved results in the oscillatory discharge of the coil.

Another improvement resides in providing an additional break B' at that end of the condenser which is adjacent the other break B, but not so as to cut off the circuit A from the latter break. I have indicated this break in Fig. 1. In this construction the breaks will be so constructed that certain of their interruptions will be substantially in unison and certain other of their interruptions will be out of unison—that is to say, if the breaks are both rotated on and by the same shaft or otherwise caused to rotate in synchronism.

The break B may have, for instance, thirty contact-segments and the break B′ may have twenty contact-segments, so that as a result there will be in one revolution ten interruptions in unison and ten times when the two breaks will be half an interval apart and ten times when they will be a whole interval apart. Any other arrangement for producing this effect may be substituted. One break may have fifteen segments and the other twenty, &c.

The effect of the above-outlined construction is that the coil is given great frequency, and when the complete construction, as indicated, Fig. 1, is employed extraordinary results may be produced by causing the proportioning and arranging of the parts to be such that a spark-gap shall be maintained in the break B with an approximately continuous discharge, the break B operating in its revolutions to increase and decrease this spark-gap and the break B′ interrupting the same by intermittingly connecting the condenser into the circuit thereof, so that the operation of the oscillator is brought down from the usual singing sound to a sharp decisive snap and the sparking thereof is changed from the usual bluish sparking to a series of white sparks. Indeed, for certain laboratory purposes a copper disk may be substituted for the break B, which being rapidly rotated will cause by reason of the slight unevenness of its surface and of the frictional contact of the brush therewith a pulsation or interruptive tendency in its circuit, producing to some extent a similar effect to that of the break B.

The primary P may be either inside or outside the secondary S, being insulated therefrom at I, and the coil may have a core, although I prefer to use it without a core.

In Fig. 2 I have shown the primary P′ outside of the secondary S′ and have shown means for adjusting the coil so as to perfectly balance the fluctuations thereof and produce the precise harmonic effect desired for the purposes of any particular use thereof—as, for instance, the study of striæ, &c.—this means consisting of two brushes *p p′*, sliding back and forth by any suitable means, being shown as mounted on conductor-rods *r r′*, insulated from each other at r^2, the insulation of the primary being grooved to form a contact-path p^2, along which the brushes may move in contact with the successive turns of the coil.

From the above description it will be evident that the sparking between the electrodes *e e′* may be varied, so as to get any kind of discharge desired, it being possible to move the brushes *p p′* together toward each other, so as to decrease the area of the primary evenly relatively to each end of the secondary, or to move one brush independently of the other, and thereby increase or decrease the relative area of the primary at one or the other end of the secondary, it being worthy of observation also that the portion of the primary which is cut out, or that is left remote from the secondary beyond the brush, is not cut out entirely, so as to be of no effect; but it has an appreciable effect in influencing the action of the coil, the latter being, however, more readily seen in connection with the apparatus shown in Fig. 3, to which reference will now be made.

I have shown a primary in Fig. 3 external to the secondary S^2 and made up of two separated portions P^2 P^3 adjacent the respective ends of the oscillator, each of these portions being made up of a flat helix of flat conductor, such as a copper ribbon, properly insulating from itself, as indicated, brushes p^3 p^4 being preferably provided movable up and down to contact with the successive layers of each helix, as shown, for the same purpose as already described in connection with the movable brushes of Fig. 2, the primary having an intermediate portion P^4 to give direction to the fluctuation. The secondary has preferably end pieces *s s′*, which may be of copper or other conductor, being preferably ribbons of tin-foil secured to the inner surface of the insulation I, these extended areas of the secondary being in the direct field of influence of the portions P^2 P^3 of the primary. The operation and advantage of this construction is that it adds capacity to the high-frequency coils, so that a bright spark and heavy discharge takes place instead of the more disruptive discharge heretofore. The end portions of large area of the secondary give a condenser action to the secondary, tending to store or accumulate potential and produce much heavier and more sudden discharges with greater drop than would take place if the secondary terminated in the fine wire itself merely.

While I have described above my new method of operating an oscillator or high-frequency coil, I may remark that particularly in connection with the form of apparatus shown in Figs. 2 and 3 one or more choke-coils *c* (see Fig. 2) may be used in order to raise the potential.

The apparatus already described is of peculiar advantage for use in the observation of vacuum-tube discharges and the study of striæ, it being necessary in such matters to be able instantly and delicately to change the conditions of observation, the operator judging thereof by the appearance of the phenomena. For instance, if the striæ are confused and indistinct it is necessary to bring the coil into tune or at least into different tune from its condition, whatever the latter may be, and it is not always feasible and it may be, in fact, impossible to get the desired results by changing the speed of the break or the charging of the condenser or the capacity of the latter, &c., so that these observations are rendered extremely difficult and unscientific.

By the adjustable feature of my invention shown in Figs. 2 and 3 the coil may be instantly and accurately adjusted, so as to bring out the striæ distinct and clear. Again, still taking the study of striæ as an illustration, it frequently happens that the latter will constantly rush toward one end of the tube or will separate at the opposite ends thereof and will waver, so that they may not be readily studied or so that they may not be photographed, for instance. My invention enables the operator at once to throw the coil into such perfect balance that he may cause the striæ to remain perfectly stationary as desired simply by moving the brush *p* or *p'* outwardly at the end of the coil which proves to be the weaker, thereby bringing the influence of a higher potential to bear upon that end of the coil or by oppositely moving the other brush to lower the potential at the stronger end of the coil.

While I have herein shown a preferred embodiment of my invention I wish it understood that I am not restricted thereto, but that various changes in details and rearrangements of the combinations of parts may be resorted to within the spirit and scope of my invention as defined by the claims.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an induction device provided with a primary having a plurality of turns, means to shift the circuit connection from one turn to another transversely of said turns, at either or both ends of the coil at will, substantially as described.

2. The combination with a relatively immovable primary and a secondary of an induction device, of means to vary the position of the field of said primary relatively to the secondary by increasing said field at one end of the secondary and decreasing it at the other end, or vice versa, substantially as described.

3. The combination with a primary and a secondary of an induction device, of means to bring a greater or less number of turns of the primary into direct inductive action on the secondary independently at either end thereof, substantially as described.

4. The combination with a primary, of a secondary having opposite end portions of large area, substantially as described.

5. The combination with a primary, of a secondary, said secondary having opposite end portions of large area, and said primary also having relatively large area opposite thereto, substantially as described.

6. In an induction device, a primary having end portions of low resistance and extended area, substantially as described.

7. In an induction device, a primary having end portions of low resistance and extended area, said portions consisting of ribbon-like flat coils, substantially as described.

8. In an electrical apparatus, a source of energy, a primary, and a break in series circuit, and a condenser and second break in parallel across said source of energy, said second break being interposed at that end of the condenser adjacent said other break, said two breaks being constructed to give certain interruptions substantially in unison, and certain other interruptions out of unison, substantially as described.

9. In an electrical apparatus, a source of energy, a primary, and a break in series circuit, and a condenser and second break in parallel across said source of energy, said second break being interposed at that end of the condenser adjacent said other break, said two breaks being constructed to give certain interruptions substantially in unison, and certain other interruptions out of unison, and said first-mentioned break having the intervals between its interruptions proportioned to the time-constant of the circuit, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
GEO. W. GREGORY.

No. 615,653. Patented Dec. 6, 1898.

T. B. KINRAIDE.

HIGH FREQUENCY INDUCTION APPARATUS.

(Application filed Mar. 4, 1898.)

(No Model.)

Fig. 1

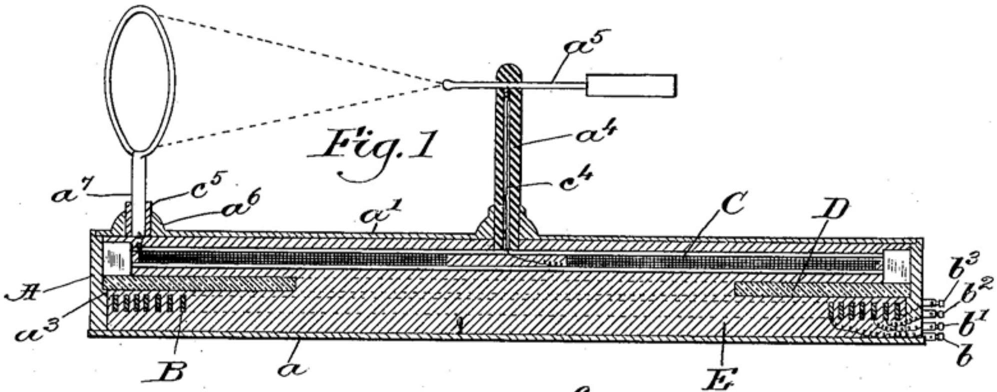

a⁵
a⁴
c⁴
a⁷
c⁵
a⁶
a¹
C
D
A
a³
B
a
E
b³
b²
b¹
b

Fig. 2

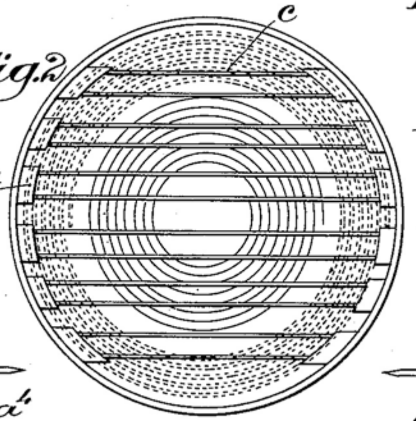


Fig. 3

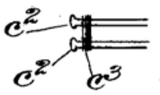


Fig. 4

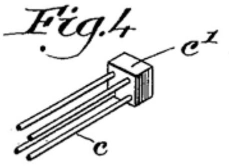
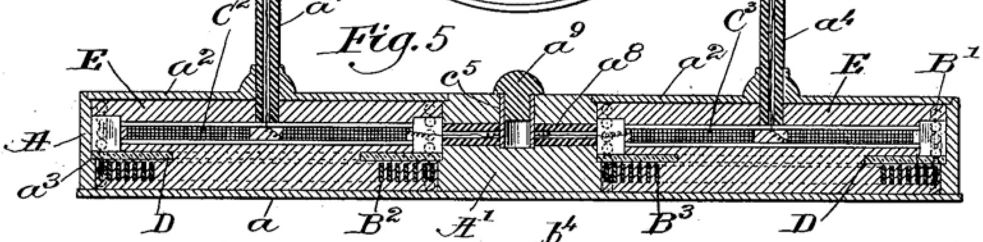


Fig. 5


a⁵
a⁵
C²
a⁴
C³
a⁴
E
a²
c⁵
a⁹
a⁸
a²
E
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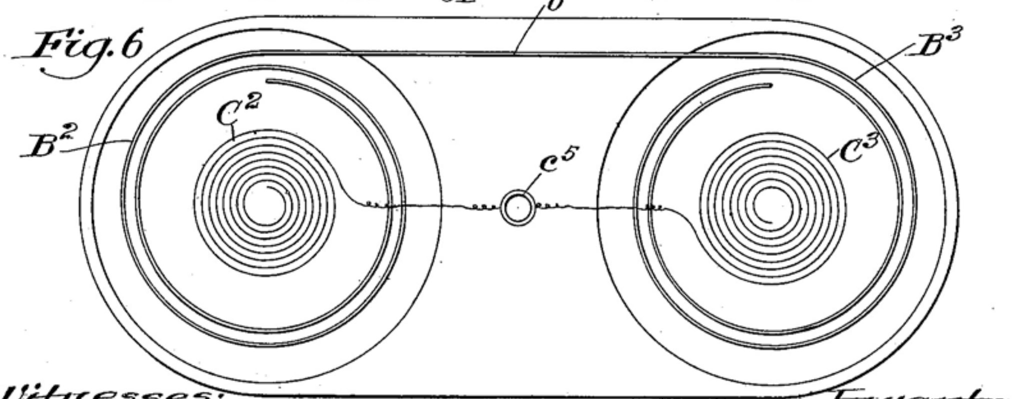
a³
D
a
B²
A¹
B³
D

Fig. 6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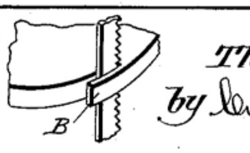
B²
C²
c⁵
C³

Witnesses:
A. C. Harmon
Walter E. Lombard

Fig. 7.



Inventor.
Thomas B. Kinraide
by Crosby Gregory Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

HIGH-FREQUENCY INDUCTION APPARATUS.

SPECIFICATION forming part of Letters Patent No. 615,653, dated December 6, 1898.

Application filed March 4, 1898. Serial No. 672,531. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in High-Frequency Induction Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is an improvement in induction-coils, and has for its principal object the provision of an apparatus capable of unlimited high frequency without danger of self-destruction or breaking down.

Induction-coils as ordinarily constructed are wound in disk form, the disks being placed side by side, usually in a columnar or tubular form over a central core, so that of course the coils are shortest, and hence offer least resistance, at the centers of the disks or next the core, and the highest potential is at the outside—*i. e.*, at the circumference of the disk—where the coils are the longest. I have departed entirely from this principle and have produced a flat coil in which the highest voltage is at the shortest turns and the lowest voltage is at the longest turns, or, in other words, the voltage increases inversely as the resistance.

In its simplest form and preferred embodiment my invention comprises a coarse primary of few turns and a fine secondary of many turns, preferably coaxially arranged, and the primary being confined to the low voltage or circumferential portion of the secondary.

The details of construction and the more complete embodiment of my invention and the more striking phenomena thereof will be set forth in the course of the following description, reference being had to the accompanying drawings, and the invention will be more particularly defined in the appended claims.

In the drawings, in which I have shown preferred embodiments of my invention, Figure 1 is a central vertical section of a simple coil or apparatus, illustrating one form of my invention. Fig. 2 is a top plan view thereof, on a reduced scale and partly diagrammatic, in order to give a clear understanding thereof. Figs. 3 and 4 are perspective details of insulators or separators employed. Fig. 5 is a view similar to Fig. 1, showing a complete embodiment of my invention. Fig. 6 is a top plan view thereof, partly diagrammatic. Fig. 7 is a fragmentary view showing one way of making the coarse primary.

In a box A of any suitable shape and size desired, being herein shown in Figs. 1 and 2 as circular and in Figs. 5 and 6 as oblong with rounded ends, I mount a primary B and a secondary C, a partition D, preferably of glass, being interposed between the primary and secondary, if desired, although it may be omitted. The box A has preferably a removable bottom *a* and top *a'*, Fig. 5, these parts being preferably constructed of vulcanite or other insulating material.

When a partition D is employed, a ledge a^3 may be molded, stamped, or turned, if desired, on the inner wall of the box, on which the partition may be seated, and for neatness of construction the top also will preferably rest on a similar ledge. The top and bottom may be screwed or otherwise secured to the edges of the walls or rim of the box, although I wish it understood that the details of the inclosing box may be infinitely varied within my invention.

I wind the secondary C, of fine wire and such area as is desired, in the form of a thin flat disk and secure it by suitable means in one of the sides of the box, herein shown as the upper side, the securing means being herein shown as comprising a plurality of glass rods *c*, arranged in pairs oppositely placed above and below the secondary and together constituting a holding-grid. It is obvious that this grid may be made in any form, the parallel bars being preferred merely for convenience. Having properly positioned the secondary between its holding-rods *c* or such other holding devices as may be used, I preferably connect the terminals of the secondary with a current sufficient to raise the secondary to a considerable heat and then pour into the box a melted insulating compound E, preferably of rosin and beeswax, sufficient to fill the box and entirely cover the secondary, preferably also covering the holding-rods *c*, as is indicated in the figures, maintaining the heat for a sufficient time to insure that the melted rosin and wax shall have permeated into every interstice of the secondary and its neighboring parts. The primary is put in position in the same manner, excepting that no holding-grid is necessary therefor, inasmuch as the inherent rigidity of the coarse wires prevents any buckling or warping thereof under the action of the heated insulating compound. The result is that when the insulating compound has hardened the primary and the thin flat disk of the secondary are insulated absolutely.

In view of the fact that my secondary is made of such fine wire and in the form of a thin disk it is necessary that it should be positively held by a grid-like holder while the wax is being poured, as otherwise it would work out of shape.

The rods c may be held at their ends by glass blocks c', as shown in Fig. 4, or a more convenient construction is that shown in Fig. 3, where it will be seen that the rods are severally provided with heads c^2 and are tied together simply by wrapping a piece of silk thread c^3 around the ends thereof. This latter construction is extremely convenient. These glass rods, it may be remarked, are also advantageous for holding thin or fragile conductors in various other relations than that herein shown.

It will be observed that the partition D is cut away at its middle portion, so that it will be understood that both sides, or, in other words, the entire apparatus, is poured at once with the insulating compound. The compound which I have mentioned is normally solid, and therefore there is no tendency in the apparatus to leak; but, on the contrary, it is substantially one piece or solid, without any danger of loosening or getting injured. Moreover, if from any cause whatever any heating effects have been produced at any point in the apparatus, it is evident that the fusible insulating compound would be softened or melted sufficiently to cause it automatically to flow around the heated portions and maintain perfect insulation.

I prefer to employ a primary made as illustrated in full lines in the figures, where it will be seen that it consists of a flat helix of coarse wire or metal, although it may be in other forms—for instance, as indicated in dotted lines at B′ in Fig. 5. This helix B is conveniently made by sawing a piece of sheet metal to produce the form shown, (see Fig. 7,) the air-gap formed by the saw-cuts being sufficient in practice to insulate the primary, especially when embedded in the insulating compound, as explained.

I have shown both primary and secondary as circular, although it will be understood that they may be square, oval, or any other shape desired—oval, for instance, being preferable where it is desired to get a long spark-gap in an instrument of the form shown in Fig. 1.

In the above description I have purposely omitted all technical details of construction in order to present my invention in its broad features and in its simplicity, although it will be understood that proper binding-posts and connections will be provided, as indicated at b^2 b^3, Fig. 1, and that the other usual features of regulation will be used in connection therewith, including a break, condenser, &c. The inner terminal of the secondary is shown at c^4 as extending in a central post a^4 to a usual adjustable electrode a^5, and the opposite terminal of the secondary is shown in Fig. 1 as terminating at a thimble or ferrule c^5 in a socket a^6, which may contain any suitable electrode, a ring-discharger a^7 being shown in place therein.

Referring to Figs. 5 and 6, it will be seen that I have provided two primaries B^2 B^3, connected together at b^4, and two secondaries C^2 C^3, electrically connected by a contact ring or ferrule c^5 similar to that already described. The two primaries and secondaries are separated by an insulating-block A′, which constitutes a portion of the box, and they are embedded in insulating compound precisely the same as described in the simpler form of the apparatus shown in Fig. 1, it being understood that the connecting-wires of the primary and secondary are carried through insulating-tubes, as is indicated at a^8, Fig. 5. The inner terminal of each of the secondaries C^2 C^3 connects with a central post a^4, containing an electrode a^5, as already described, and the thimble or ferrule c^5 (shown in Fig. 5 as stopped by a plug a^9) is adapted to receive a discharge-ring a^7 or any other form of electrode, although usually it will be stopped by the plug, as shown. The primary is restricted to the circumferential portion of the secondary—that is to say, it is located in the vicinity of the outer or larger turns of the secondary in the form of an annulus having a large central aperture. Besides this, I make the primary relatively short and of large cross-sectional area, the latter feature giving the primary large condenser or static capacity. Also there is an entire absence of any core or anything of that nature to produce sluggishness. The result is that I am enabled to obtain exceedingly high frequency without destructive heating.

The primary being entirely or mainly located at one side of or adjacent the circumferential portion of the secondary and there being no core of magnetic material, but only electrical inductive action, there results a piling up or condensing of the lines of force at the center of the secondary in an obvious vertical form, so that the potential or voltage of the inner portion of the coil is high and of the outer portion low. The intensity of the electrical field is enormously increased at the center of the coils and nearly all the lines of force of the entire coil are concentrated upon this central portion thereof, and the construction is such that this condition is maintained—that is to say, there is an enormous propulsive discharge from the electrode at the center of the coil and there is scarcely any discharge from the outer electrode thereof at c^5. This will be understood by referring to Fig. 1, where I have indicated by dotted lines the discharge effects. The discharge takes place or may take place like radiant flames collected by a ring, as shown in Fig. 1, or by removing the ring or turning the electrode a^5 at some other angle this radiant discharge simply shoots out into space.

One great advantage besides that already pointed out of the high frequency and enormous discharge is that there is no fear of melting down the coil. Heretofore in induction-coils it has been necessary to exercise extreme care in regulating the discharge-terminals so as to prevent too great resistance between them, as otherwise the apparatus would at once short-circuit itself and quickly be ruined, whereas in my present invention all this is done away with.

While I have herein described a preferred embodiment of my invention, I wish it understood that very many changes and rearrangements may be resorted to without departing from the spirit and scope of the invention and that I am not limited otherwise to details than as expressed in the appended claims.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An induction device, comprising a secondary in the form of a flat coil, and a primary in the form of a flat coil, superimposed flatwise and coaxially one on the other, said primary being in the form of an annulus having a large central aperture relatively to the said coaxial secondary, as and for the purpose set forth.

2. An induction apparatus comprising a winding producing an exciting-field, and an electric conductor excited thereby, said conductor having a plurality of turns of varying lengths, said field-winding being located adjacent the longer of said turns, and the shortest of said turns having the highest voltage, substantially as described.

3. An induction apparatus comprising an electric conductor whose resistance per turn diminishes as its voltage increases, and an exciting-field winding adjacent and confined to the low-voltage portion of said conductor, substantially as described.

4. In an induction apparatus, a plurality of turns of electric conductor, said conductor being constructed and wound to present decrease of resistance in the turns toward one end with an increase of voltage toward the same end when under the influence of current, and means to maintain said high voltage at said end of minimum resistance per turn, substantially as described.

5. An induction device having a primary of sheet metal, the turns of said primary being insulated from each other by a saw-cut, substantially as described.

6. An induction device comprising a shallow box having a closed bottom and an intermediate partition, said partition extending to the walls of the box parallel to the bottom, a flat coil of a single thickness of wire being contained between the partition and the bottom of the box and confined to that portion thereof adjacent the walls of the box, and a flat coil constituting a secondary being contained in the box on the opposite side of said partition and extending approximately to the center of the box, the box being filled with, and said primary and secondary being embedded in, a fusible insulating substance normally solid, substantially as described.

7. An induction device comprising a shallow box having a closed bottom and an intermediate partition, said partition extending to the walls of the box parallel to the bottom, a flat coil of a single thickness of wire being contained between the partition and bottom of the box and confined to that portion thereof adjacent the walls of the box, and a flat coil constituting a secondary being contained in the box on the opposite side of said partition and extending approximately to the center of the box, the box being filled with, and said primary and secondary being embedded in, a fusible insulating substance normally solid, said secondary being retained from warping by means of an insulating-grid comprising bars extending across it both above and below, substantially as described.

8. An induction apparatus comprising a plurality of primaries connected together in series at one of their terminals, combined with a secondary for each primary, said primaries and secondaries being constructed and arranged to maintain high voltage at the center of each secondary, and low voltage at the circumferential terminals thereof, the inner terminal of one of said secondaries being positive and the inner terminal of the adjacent secondary being negative, substantially as described.

9. An induction apparatus comprising a plurality of primaries connected together in series at one of their terminals, combined with a separate secondary for each primary, said secondaries having regions of high voltage at their centers, and regions of low voltage at their circumferential terminals when the apparatus is in action, substantially as described.

10. An induction apparatus comprising a plurality of primaries connected together, and a secondary for each primary, said secondaries being respectively located substantially coaxially relatively to their primaries, and each being wholly or mainly within the primary, the latter being adjacent the circumferential portion of the secondary only, whereby a large propulsive discharge may be maintained at the central terminal of the secondary with an inappreciable discharge at the circumferential terminal thereof, substantially as described.

11. An induction apparatus comprising a

plurality of coarse, short, flat-coiled primaries connected together, and a corresponding plurality of long, fine secondaries wound in the form of flat coils, each primary being wound with a large central aperture, and having its coils restricted to the area adjacent the longer of the turns of its secondary, substantially as described.

12. An induction apparatus comprising a shallow box having a plurality of compartments and removable tops therefor, each compartment containing a coil constituting a primary, and a second coil constituting a secondary, said coils being coaxial with each other and the secondary extending within the primary, said coils being embedded in a fusible insulating substance normally solid and filling said several compartments, said box having insulated passages connecting said boxes, and said several primaries having one of their terminals communicating through said passages, and a discharge post or device for the central terminal of each secondary, substantially as described.

13. An induction device comprising a shallow box having a closed bottom, a flat coil of a single thickness of wire adjacent said bottom and confined adjacent the walls of the box, and a flat coil constituting a secondary winding contained in the box adjacent the other winding and extending approximately to the center of the box, said secondary winding being retained from warping by means of a plurality of glass bars arranged transversely thereof on opposite sides of the winding, the box being filled with and said primary and secondary being embedded in a fusible insulating substance normally solid, substantially as described.

14. An insulating-grid adapted to bind together and insulate a disk or other winding, said grid being composed of glass bars arranged opposite to each other on opposite sides of the winding and projecting therebeyond at their ends, said ends having heads adapted to be bound together by a filament, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
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No. 619,760. Patented Feb. 21, 1899.

T. B. KINRAIDE.

ELECTRICAL APPARATUS.

(Application filed May 5, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

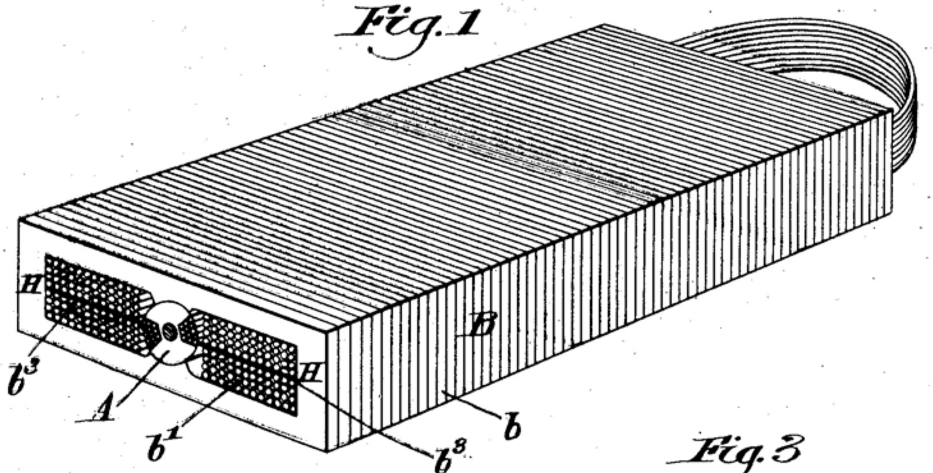

H
b3
A
b1
H
b8
B
b

Fig. 2.

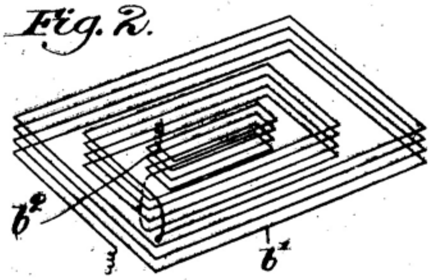


Fig. 3

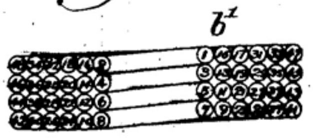


Fig. 4.

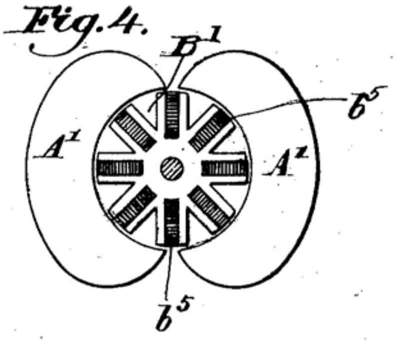
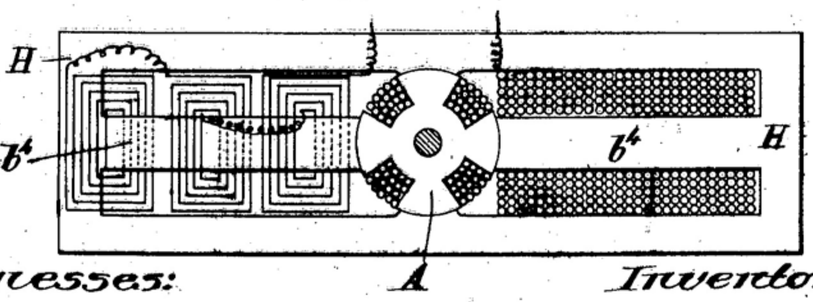

B1
b5
A1
A1
b5

Fig. 5.



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No. 619,760. Patented Feb. 21, 1899.

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ELECTRICAL APPARATUS.

(Application filed May 5, 1898.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 6.

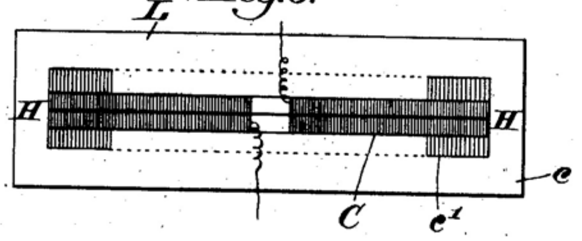


Fig. 7

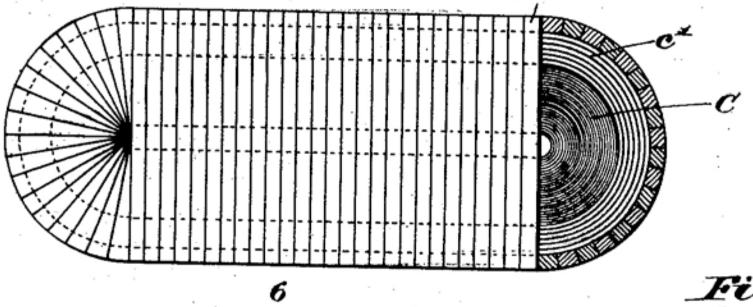


Fig. 9

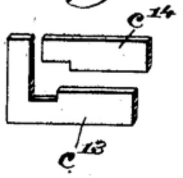


Fig. 8

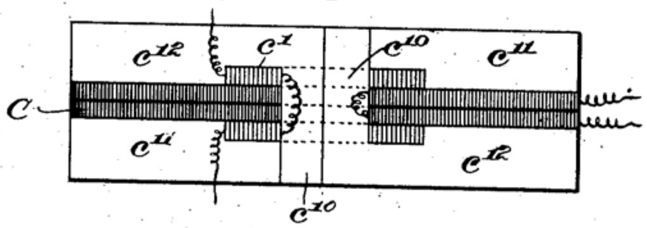

c^12
c^1
c^10
c^11
C
c^11
c^12
c^10

Fig. 10.

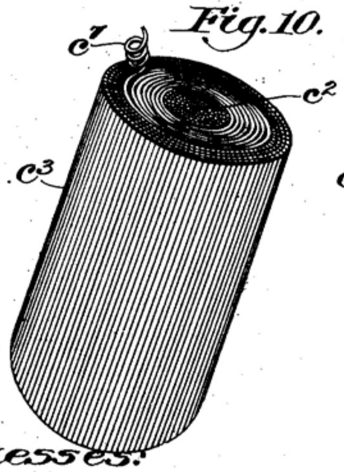
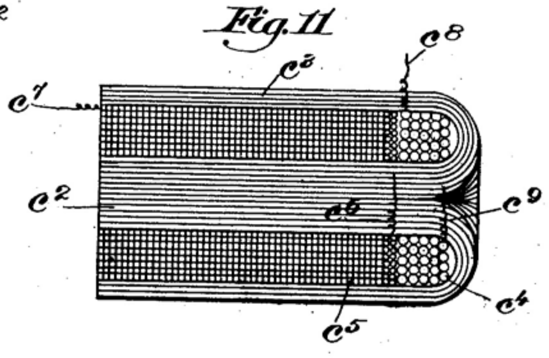


Fig. 11


c^8
c^3
c^7
c^2
c^6
c^9
c^4
c^5

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Inventor:

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UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

ELECTRICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 619,760, dated February 21, 1899.

Application filed May 5, 1898. Serial No. 679,800. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Dynamos, &c., of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

My invention aims to accomplish an increased efficiency in electrical apparatus by means of a new winding thereof, which I have discovered to be the only proper winding for taking advantage of the natural impedance and inductance, so as to give a proper rise of potential in the direction desired only.

I have illustrated my invention in several different forms of apparatus in order that it might be fully apprehended, and the details of these devices will be more fully understood from the following description, reference being had to the accompanying drawings, and the invention will be more particularly defined in the appended claims.

In the drawings, Figure 1 is a perspective view, partly diagrammatic, illustrating one manner of constructing a dynamo to embody the principles of my invention. Figs. 2 and 3 are diagrammatic figures illustrating the manner of winding. Fig. 4 is a vertical section showing the principles of my invention applied to a different form of dynamo. Fig. 5 is a central transverse section of another form of dynamo, the right hand thereof showing the windings in section and the left hand thereof illustrating, diagrammatically, the manner of winding. Fig. 6 is a vertical transverse section taken on the line 6 6, Fig. 7, showing my invention applied to a transformer. Fig. 7 is a top plan view, partly in section, of said transformer. Fig. 8 is a central vertical sectional view of another form of transformer. Fig. 9 illustrates in perspective the plates constituting the magnetic field of the latter transformer. Figs. 10 and 11 show, respectively, in perspective and central longitudinal section a modified form of transformer.

Referring to Fig. 1, it will be seen that I have provided a rotating field A and a stationary armature B, the latter being made up of laminated plates or stampings *b* and internal windings *b'*. If such a form of dynamo were to be built with usual windings, the wire would be wound around one or the other or all the iron walls constituting the shell or magnetic field of the armature B. Instead of this method of winding I inclose all the wires within the stampings and I wind the wire in a peculiar manner illustrated in Figs. 2 and 3, where it will be seen that beginning at the inner terminal b^2 the wire is carried in a winding parallel to the rotating field A in successive turns, as indicated by numbers in Fig. 3, so that the wire is built up in successive layers from the inside outward until half of the cavity (at one side the heavy line b^3, Fig. 1) within the stampings is entirely filled, and then the same method of winding is followed until the opposite half of the cavity is entirely filled, the outer layers of the two bodies of windings being joined in circuit, so that we have a U-shaped mass of windings with the opposite terminals thereof next to the rotating field A. This winding will be clearly understood by following the numbers in Fig. 3 and observing the graphic representation of said winding in Fig. 2, from which it appears that successive coils are made until opposite parallel layers are formed, (indicated, respectively, by the figures 1 3 5 7 and 2 4 6 8,) and then the same wire continues laying adjacent layers, (indicated, respectively, by the figures 9 11 13 15 on one side and 10 12 14 16 on the other side,) the same wire then being carried back in the next layer, as indicated on one side by 17 19 21 23 and on the other side by 18 20 22 24, and then the last peripheral coil made in the half of the cavity of the armature filled by the windings thus far described continues over to the other half of said cavity, being coiled in precisely the same manner as before, the turns, however, proceeding from the periphery inward in the reverse manner to that already explained. In other words, supposing the last peripheral turn on one side the line b^3 to be made by the wire 48, this wire is continued past the dividing-line b^3 to the side of the cavity, which we will suppose to be vacant, winding precisely as before the turns 48 47, 46 45, 44 43, 42 41, which form the outermost or peripheral layer adjacent the ends of the stampings *b*, the same wire being thence continued in its windings to form adjacent and within said outermost layer another layer, (represented by the figures on one side 40 38 36 34 and on the other side 39 37 35 33,) and so on, winding in successive layers the same wire until said wire ends up with the last coil 2 1 of the last or innermost layer lying in line with the first or starting layer with which the winding was begun at the opposite end of the wire, the first coil 1 2 being at one terminal of the entire winding and the last coil 2 1 being at the other terminal thereof. The result is that as the field A rotates, thereby disturbing the induced magnetic conditions of the magnetic body B, which for the time being has become an induced magnet, the magnetic lines of the body B, when released from their inducing source, follow the usual law of induced magnets, and fall away from the region of the field A toward H, causing usual fluctuations in the winding of the armature, and the lines of force in the magnetic field provided by the enveloping body or jacket B fall on the wires of the windings and outwardly toward the ends thereof at H, thereby creating the greatest impedance at the adjacent portion of the windings and removing from the inner portions of the windings the hindrance of the lines of magnetic force, so that the rise of potential of the entire winding is free to take place at the terminals of the windings adjacent the field A, and consequently a high-potential region is maintained immediately adjacent the rotating field, and a low-potential region in the winding is maintained at the remote portions of the winding adjacent the parts marked H in Fig. 1. In Fig. 5 I have shown the same principle of winding applied to an armature made up of different-shaped stampings, the stampings shown in Fig. 5 having a central core portion b^4, around which the wire is wound. The principle of winding, however, is the same as before explained—that is to say, the current has to pass from the low-potential or outer portion of the armature along the entire length of the whole winding before it can reach the high-potential or inner portion of the armature adjacent the rotating field. This is different from previous windings in that the old way of winding would be to start, for instance, at the same end as in my winding; but instead of winding the wire outward in layers transversely to the portion b^4, as indicated, the wire would be wound directly on the portion b^4 in a spiral form throughout the length of said portion b^4, and then back again to the start in a second layer, and so on back and forth in layers extending parallel to the length of the armature instead of extending transversely thereto, and the result would be that the current would simply have to pass throughout the length of wire of one layer in order to pass from the low-potential region to the high-potential region of the armature, and then the current in traveling farther along the winding would pass back again along the next layer, traveling from the high-potential region to the low-potential region, and so on back and forth, according to the number of layers, until finally it would reach the outgoing terminal. I repeat, therefore, that the distinction of my winding thereover is that all the current as it is generated by the falling of the magnetic lines of force from the field A toward the end H is drawn off without impedance from the end of the winding away from which the lines of force are falling, and this takes place throughout the successive turns of the winding until every turn thereof back to the very end H discharges freely all its current in the one direction, all discharge in an opposite direction being prevented by the impedance of the lines of magnetic force at and falling toward the high magnetic potential ends H. Accordingly an armature constructed as shown in Fig. 5 would present constant high potential adjacent the rotating field, and the potential would be raised under the most favorable conditions, inasmuch as the lines of force of the surrounding magnetic field would be continually falling across the turns of wire back so as continually to keep releasing one and the same end of the winding from their impeding influence, while continuing to choke the opposite ends thereof adjacent H.

In Fig. 4 I have indicated the field at A' and have provided a rotating armature B', made up of stampings in usual manner, the difference over a usual dynamo being, however, that I have wound the armature as already described, b^5 indicating a ribbon winding, which begins adjacent the core of the armature and winds in successive layers thence outwardly in a radial direction, so that, for the reason already explained, there is a constant region of high potential adjacent the periphery of the armature and the inner terminals at the core are low potential. This is not only of advantage in that it gets all the benefit of the cutting lines of force in the magnetic field in the most natural manner as they fall across the turns successively from the inner to the outer portions of the windings, but also it requires only one terminal to be provided for the high-potential-current delivery from the apparatus, thereby permitting the return-conductor of the circuit to be correspondingly light and inexpensive for the extremely low voltage duty required of it.

In Figs. 6 and 7 I have shown a secondary C, wound in the same manner already described in detail and as shown in Fig. 1, the iron field c being cut away at c' to receive a primary preferably wound also on the same principle as the secondary. This produces what may be termed "a magnetic oscillator," in which all the lines of force of the magnetic field (whether closed or open) are permitted on an interruption of the current in the primary to fall across the secondary, so as to cut all the turns thereof successively from the center toward H and progressively throughout the length of the wire. In a transformer wound in the old way the lines of force would cut successive turns, to be sure, but would not cut said turns progressively along the whole wire, inasmuch as the windings would be transverse to the direction that I employ. This will be more readily understood viewing Figs. 10 and 11, which show the magnetic field as made up of wires forming at the center a core c^2 and bent around the outside of the windings to form a jacket c^3. The old way of making a transformer in this form would have been to wind the primary along the core c^2 from one end to the other and then wind the secondary over the primary in successive layers parallel to the core back and forth. My winding, it will be seen, is entirely different from this, for I wind the primary c^4 at one end, as clearly indicated, and then wind the secondary c^5 in successive layers transversely to the core c^2 instead of parallel thereto, so that all the current passes out from the delivery or outgoing terminal c^7 without any impedance, because as the lines of force fall and cut the turns, beginning at c^7 and falling back toward the opposite terminal c^6, the wire is left free to discharge its current in one direction only, and this continues until all the wire is left free back to its terminal c^6. In Fig. 8 I have shown a form of transformer wound on the same plan, but having a central core c^{10} and opposite disk-like magnetic fields c^{11} c^{12}, connected therewith, the stampings in this case being made up of pieces c^{13} c^{14} (shown in detail in Fig. 9) and put together in an obvious manner.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an electrical apparatus, a body producing a magnetic field, a winding within the influence of said body, means to maintain high-potential and low-potential regions respectively in opposite parts of said magnetic field, and means to cause fluctuations of said field, said winding being wound to present conditions of electrical potential related inversely to the magnetic potential of the field, and having decreasing potential throughout its entire length from its high-potential region to its low-potential region, substantially as described.

2. In an electrical apparatus, an enveloping body providing a magnetic field for the apparatus, a winding arranged in and subject to the influence of said field, means to set up conditions of potential high and low relatively to each other in different regions of said field, and means to cause fluctuations of said field, said winding having its terminals adjacent the region from which the magnetic lines fall on a fluctuation of said field, said winding being similarly wound from its said terminals to its intermediate portion, the latter being adjacent the region toward which said magnetic lines fall, and being wound to present decreasing potential throughout its entire length from its said respective terminals to its said intermediate portion, substantially as described.

3. In an electrical apparatus, a body providing a magnetic field for the apparatus, a winding arranged in and subject to the influence of said field, means to set up conditions of potential high and low relatively to each other in different regions of said field, a primary winding restricted to the region of said field toward which the magnetic lines fall, said first-mentioned winding being wound in said field to present conditions of electrical potential related inversely to the magnetic potential of the field, said winding having decreasing potential throughout its entire length from its high-potential region to its low-potential region, substantially as described.

4. In an electrical apparatus, a magnetizable shell or jacket providing a magnetic field for the apparatus, a winding arranged in and subject to the influence of said field, means to set up conditions of potential high and low relatively to each other in different regions of said field, a primary winding restricted to the region of said field toward which the magnetic lines fall, said first-mentioned winding having its terminals adjacent the region away from which the magnetic lines fall, being similarly wound from its said terminals to its intermediate portion, the latter being adjacent said primary winding, and said first-mentioned winding being wound to have its potential decreasing throughout its entire length from its said respective terminals to its said intermediate portion, substantially as described.

5. In an electrical apparatus, a thin, flat secondary winding wound in two similar bodies side by side proceeding from the intermediate portion of the winding constituting the secondary and each of said bodies winding in successive layers or coils progressively shorter throughout its length from the periphery to the central portion thereof, and a primary winding restricted to the peripheral portion of said secondary, part thereof being on one side and part on the opposite side of said secondary, substantially as described.

6. In an electrical apparatus, a thin, flat secondary winding wound in two similar bodies side by side proceeding from the intermediate portion of the secondary and each winding in successive layers or coils progressively shorter throughout its length from the periphery to the central portion thereof, and a primary winding restricted to the peripheral portion of said secondary, part thereof being on one side and part on the opposite side of said secondary, and a magnetic jacket or body inclosing said windings, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
JOHN C. EDWARDS.

No. 619,761. Patented Feb. 21, 1899.

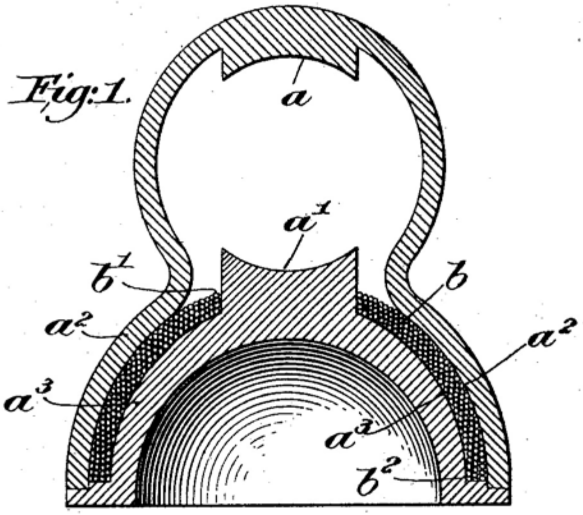
T. B. KINRAIDE.

DYNAMO ELECTRIC MACHINE.

(Application filed Sept. 29, 1898.)

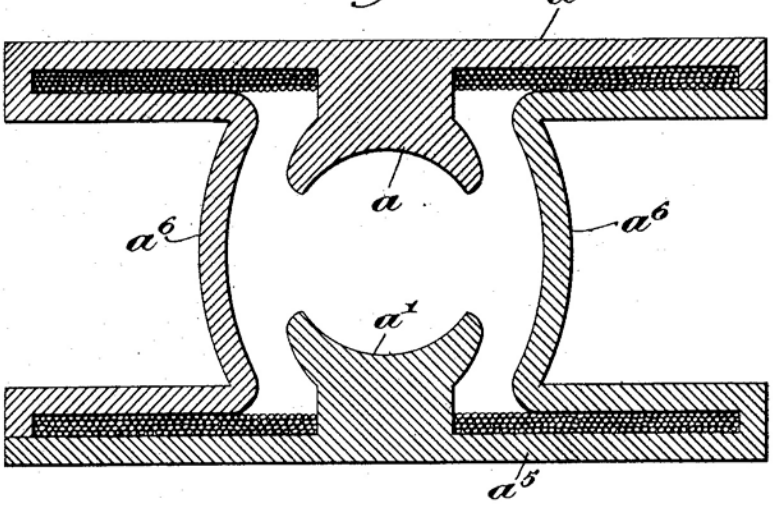
(No Model.) 2 Sheets—Sheet 1.

Fig: 1.



a
a1
b1
b
a2
a2
a3
a3
b2

Fig: 2.



a4
a
a6
a6
a1
a5

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James M. Urquhart.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 619,761. **Patented Feb. 21, 1899.**

T. B. KINRAIDE.

DYNAMO ELECTRIC MACHINE.

(Application filed Sept. 29, 1898.)

(No Model.) 2 Sheets—Sheet 2.

Fig: 3.

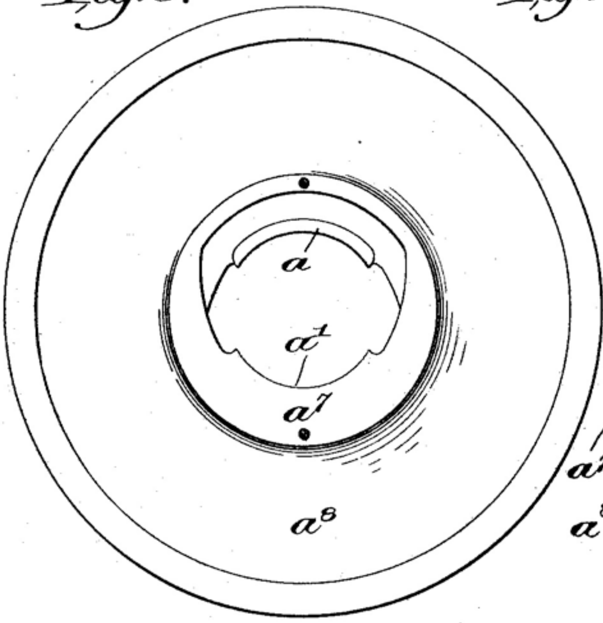
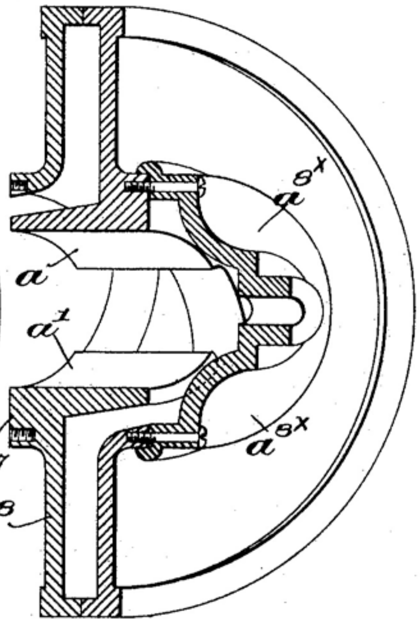
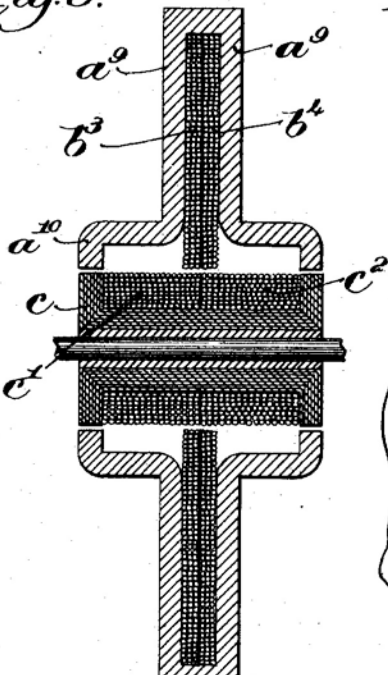


Fig: 4.



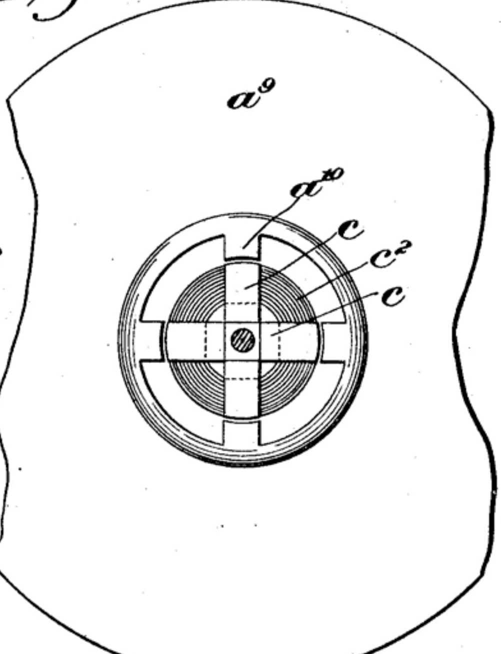
a^{8x}
a
a^1
a^{8x}
a^7
a^8

Fig: 5.



a^9
a^9
b^3
b^4
a^{10}
c
c^2
c^1

Fig: 6.



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UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 619,761, dated February 21, 1899.

Application filed September 29, 1898. Serial No. 692,159. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Electrical Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is herein shown as applied to dynamos or motors, and it resides in the discovery or application of a new principle of winding, by which the lines of magnetic force are conveyed from a larger area to a smaller area for use, thereby producing polarization without any large extent of interior repulsion, such as is manifested in bar or cylindrical magnets or pole-pieces.

My invention might be termed a "focalizer" or "magnetic transformer" for the reason that it focalizes at the center all the lines of force from the successively longer turns toward the periphery. This gives quantitative effect and transforms the magnetic effect due to the lines of force from the longer turns at the periphery into magnetic potential at the center.

My invention will be more fully apprehended from the following description, taken in connection with the accompanying drawings, which are illustrative of different embodiments of my invention.

In the drawings, Figures 1 and 2 are central vertical sections of field-magnets constructed and wound to embody my invention. Fig. 3 is a view in side elevation, and Fig. 4 is a sectional perspective, of another form of field-magnet for a dynamo or motor embodying the same principles. Fig. 5 is a central vertical section, and Fig. 6 a side elevation, (partly broken,) of still another construction embodying the same invention, these figures showing the focalizer-field with extension-poles.

In Fig. 1 I have shown a field-magnet having two opposite pole-pieces a a', which, it will be understood, coöperate with an armature, which, however, is not shown, inasmuch as it does not constitute part of my present invention, my invention relating to the form and arrangement of the field-winding. The field-winding is indicated at b, where it will be seen that instead of being wound around the pole-piece in the form of a cylinder, which would be the usual winding, it is wound with progressively longer coils or turns, the shortest turns being at b' and increasing in length from that point to the outer or peripheral turns at b^2. Preferably the winding is very thin, in order that it may have direct action upon an extended area of the magnetic-field material, and I have herein shown the respective poles as energized from the opposite parallel surfaces a^2 a^3, thereby producing a motor or generator of the iron-clad type.

In Fig. 2 the pole-pieces a a' are at the center of disks a^4 a^5, connected at a^6 to constitute virtually one magnet.

Figs. 3 and 4 also show disk-shaped fields in which the pole-pieces a a' project in opposite directions from the hubs a^7 of similar castings a^8, the latter preferably having extensions $a^{8\times}$ thereof to constitute journal-bearings for the armature-shaft. (Not shown.)

Figs. 5 and 6 show a four-pole alternator having a split winding made up of the two parts b^3 b^4, which act on the disk-shaped field-magnets a^9 the same as in the other figures, the difference being, however, that the pole-pieces a^{10} are spread apart or extended, an armature being shown in position having stampings in the form of flat oblong strips of sheet metal c, bent at right angles opposite the pole-pieces and containing armature-windings c' c^2, which may or may not rotate with the armature, as may be preferred. This form of winding focalizes the magnetic lines to the best advantage and produces a quantitative effect at the pole-piece at the center.

One advantage of my new system or manner of winding is that much less winding is necessary for giving a practically-saturated pole-piece, and, moreover, the polarization of the lines of magnetic force takes place in the most natural manner without interior repulsion or pressure except at the place of use where required, and the lines of force are not wasted and dissipated. Their natural and normal outlet or direction of movement in or on the iron is toward the pole-piece at the center, where the polarization is desired. Also by having the winding spread out in thin layers, as shown especially in Figs. 1 and 2, there is a minimum conflict of lines of force in the windings themselves, there being merely enough thickness of winding over the surface of the iron to generate just the number of lines of force which can be accommodated by the iron.

By this system of winding the field offers less resistance to the flow of the energizing-current, the strength of the field at the periphery being almost *nil*, while at the center the concentration gives great strength, and on account of this low resistance I am enabled to obtain a much higher degree of saturation in the coil of the armature, and in consequence much greater efficiency from the machine.

By spreading the pole-pieces, as in Fig. 5, I am enabled to employ an armature or secondary winding of very many turns and small diameter, which produces high voltage.

I have chosen for illustration in explaining my invention castings adapted to dynamos or motors; but it will be understood that my invention is not restricted in this respect, but may be used for transformers of various descriptions and, indeed, for a wide range of electrical work, and I intend herein to claim the same broadly.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electrical apparatus, an electromagnet for producing a magnetic field, and means for polarizing or converging the lines of magnetic force of said magnet from a large area thereof to a smaller area or pole, said means including a winding spread out coextensively with said large area and immediately adjacent to the surface of said magnet, substantially as and for the purpose set forth.

2. In an electrical apparatus, an electromagnet having its center of polarization substantially coincident with the mechanical center of the magnet, said magnet extending therefrom in a relatively thin body of constantly-increasing circumferential area from said center, and a relatively thin winding for said magnet, said winding having its turns constantly longer as they recede from said center of polarization, substantially as described.

3. In an electrical apparatus, coöperating magnets having central pole-pieces or places of polarization, said magnets each extending laterally in divergent directions from their respective regions of polarization, and windings for said magnets, said windings proceeding from said central pole-pieces outwardly along the surfaces of said radiating parts of the magnets in turns longer as they recede from the said pole-pieces, and said magnets inclosing their said windings between them, substantially as described.

4. In an electrical apparatus, coöperating magnets having central pole-pieces or places of polarization, said magnets each extending laterally in divergent directions from their respective regions of polarization, and windings for said magnets, said windings proceeding from said central pole-pieces outwardly along the surfaces of said radiating parts of the magnets in turns longer as they recede from the said pole-pieces, and said magnets inclosing their said windings between them, the said pole-pieces being spread apart, and an armature to coöperate with said pole-pieces, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
ALEXANDER C. PROUDFIT.

No. 623,316. Patented Apr. 18, 1899.

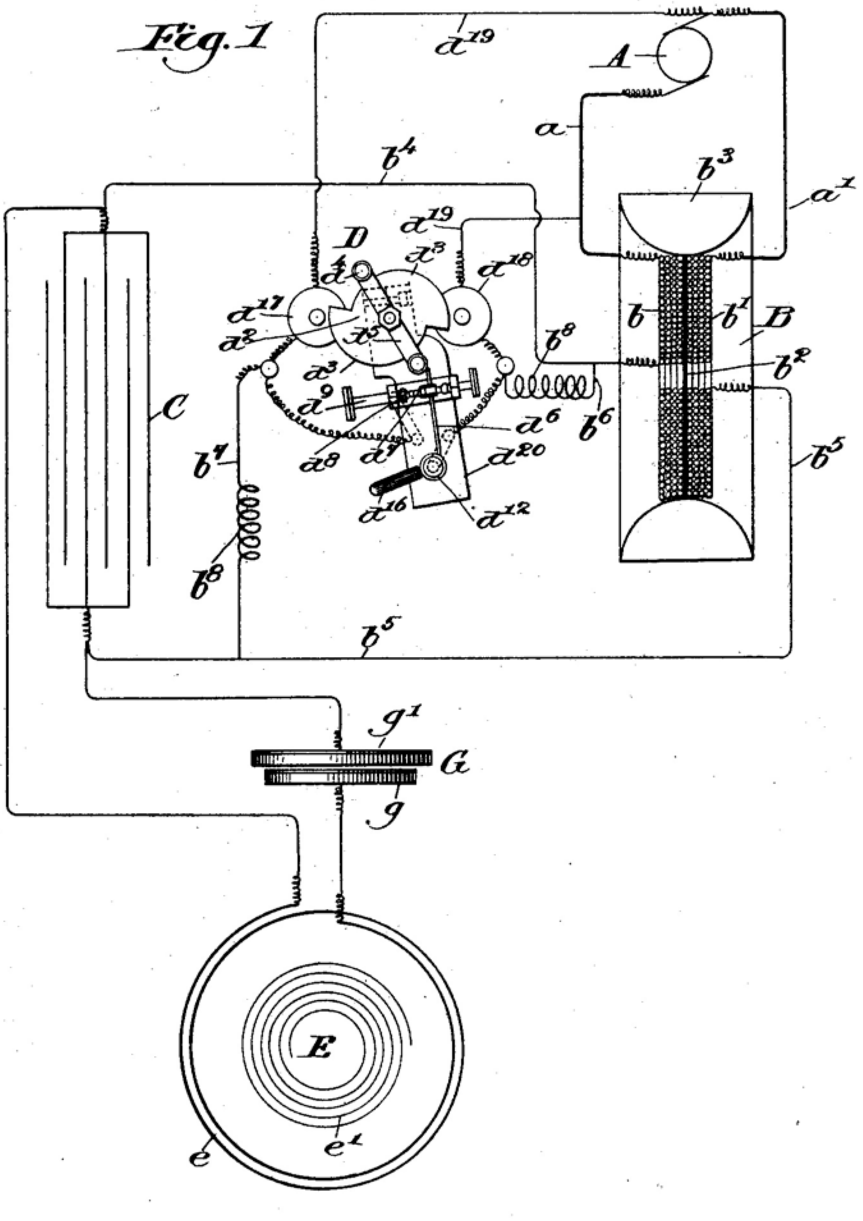
T. B. KINRAIDE.

INDUCTION APPARATUS.

(Application filed May 5, 1898.)

(No Model.) 3 Sheets—Sheet I.

Fig. 1



a^{19}
A
a
a^{1}
b^{4}
b^{3}
a^{19}
D
a^{4}
a^{3}
a^{18}
a^{17}
a^{2}
a^{5}
b
b^{1}
B
b^{8}
b^{2}
a^{3}
a^{9}
a^{6}
b^{6}
C
b^{7}
a^{8}
a^{7}
a^{20}
b^{5}
a^{16}
a^{12}
b^{8}
b^{5}
g^{1}
G
g
E
e
e^{1}

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No. 623,316. Patented Apr. 18, 1899.

T. B. KINRAIDE.

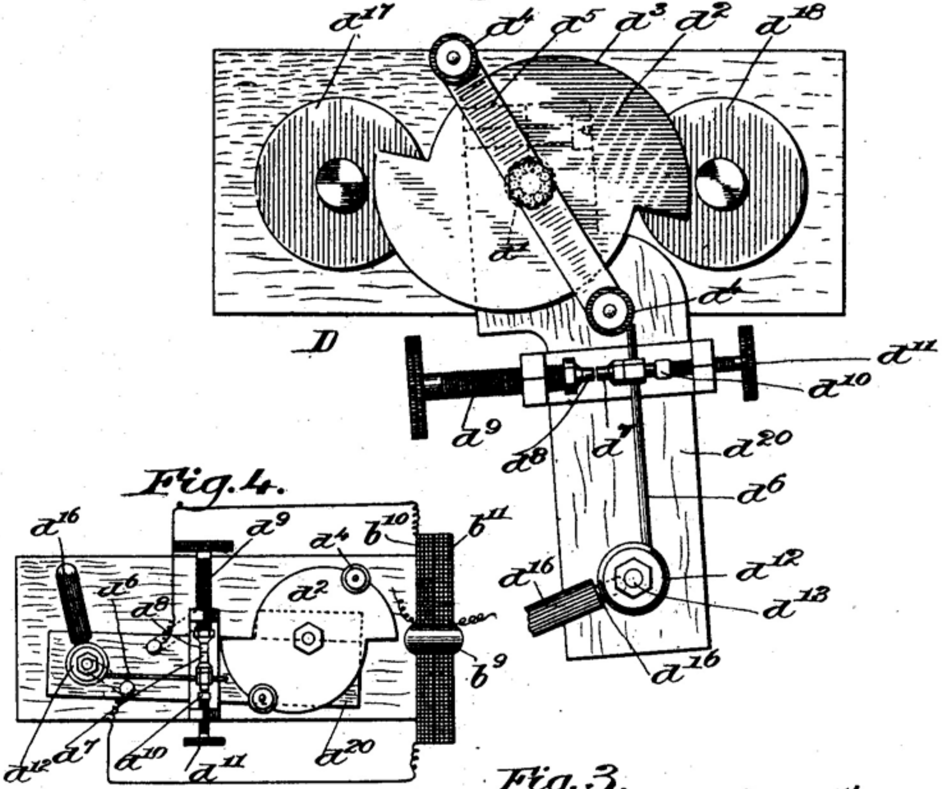
INDUCTION APPARATUS.

(Application filed May 5, 1898.)

(No Model.) 3 Sheets—Sheet 2.

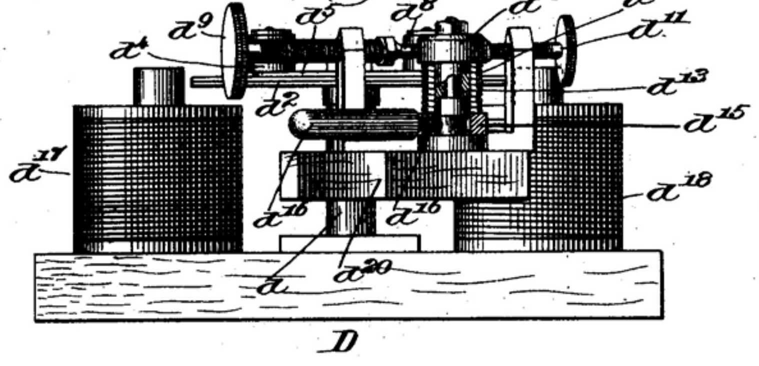
Fig. 2.

Fig. 4.



a17
a4
a5
a3
a2
a18
a1
a1
D
a11
a10
a9
a8
a7
a20
a6
a12
a13
a16
a16
a16
a16
a9
b10
b11
a6
a4
a8
a2
b9
a12
a7
a10
a11
a20

Fig. 3.



a9
a5
a8
a12
a14
a11
a4
a13
a2
a15
a17
a18
a16
a16
a
a20
D

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No. 623,316. Patented Apr. 18, 1899.

T. B. KINRAIDE.

INDUCTION APPARATUS.

(Application filed May 5, 1898.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 5.

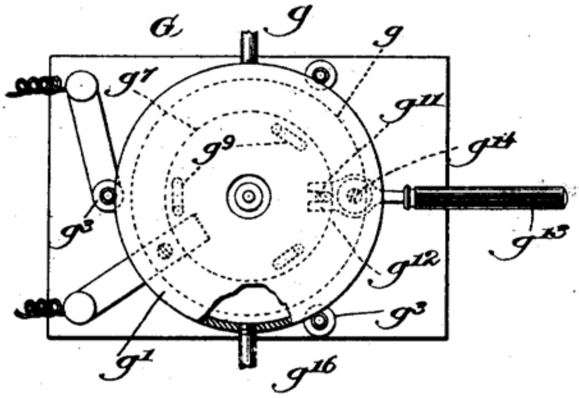
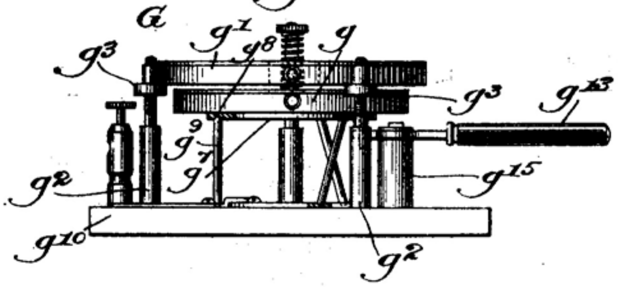

G
g
g
g7
g11
g9
g14
g8
g13
g12
g3
g1
g16

Fig. 6.


G
g3
g1
g8
g
g3
g13
9
g7
g
g2
g15
g10
g2

Witnesses:

A.C. Harmon.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

INDUCTION APPARATUS.

SPECIFICATION forming part of Letters Patent No. 623,316, dated April 18, 1899.

Application filed May 5, 1898. Serial No. 679,799. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Induction Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is an improved induction apparatus whereby discharges are made possible of greater efficiency, as will more fully appear in the course of the following description.

I will describe the details of my invention with reference to the accompanying drawings, which illustrate a preferred form of the apparatus.

In the drawings, Figure 1 is a view, partly diagrammatic and partly in section and plan, illustrating the arrangement of the system according to my invention. Fig. 2 is a top plan view of the break. Fig. 3 is a front elevation thereof, parts being broken away to show the detailed construction. Fig. 4 is a view similar to Fig. 2, showing a modified form thereof. Fig. 5 is a top plan view of my improved spark-gap. Fig. 6 shows the spark-gap in elevation.

Heretofore there has always been a considerable amount of waste energy in systems for developing high potential, and also there has been an ever-present danger of breaking down and destroying the apparatus by its own output, and accordingly it has been my present aim to provide a system in which all the increase of potential which may be developed shall be delivered for use for the translating devices and in which the apparatus is self-containing and practically indestructible.

Let A designate a dynamo, battery, or any other suitable source of electrical energy. From the dynamo the current passes by conductors a a' to an inductance device B, each conductor a a' having its own coil b b', said coils being preferably insulated from each other, as indicated at b^2, and surrounded by a laminated core b^3. Each coil b is wound transversely back and forth until the opposite terminals b^4 b^5 reach the center and are thence carried to the opposite ends of a condenser C, a break D being interposed and connected to the main conductors b^4 b^5 at b^6 b^7 and the discharge from the condenser being received by a translating device (herein shown as a special induction-coil E) by means of an automatic spark-gap G.

Each one of the details of apparatus above enumerated as constituting my system is of special construction and peculiar effect in the system, whereby it becomes possible to discharge currents of considerable strength with great velocity through the primary of the coil E, the discharge across the spark-gap being of very great amperage and exceedingly short and sharp oscillations.

Referring now to the inductance device B, I will explain that the object of this device is to raise the potential of the current and cause all this increase of potential to pass to the condenser, preventing any of it from discharging through the dynamo.

By my device the total potential is delivered only from the forward end of the wire or the one toward the condenser, and also there is only one end of the coil which has high potential. This is because the lines of magnetic force occasioned by the flow of the electric current, which during said flow are radiated from the core or field b^3, fall from the center across all the turns of wire into the periphery as the circuit is interrupted, and hence maintain a region of constant magnetic intensity at the periphery, effectually checking all rise of potential at that end, but leaving the opposite or outgoing end free from the presence of the lines of magnetic force as soon as the break occurs, and therefore without impedance. As soon as the current is broken the lines of force fall back toward the iron core and leave the central portion of the coil free from the restraining influence of these lines of force, said lines cutting across the successive turns of wire, the coil being left free to permit the induced current of increased potential to flow toward the center of the coils or toward that point which has no magnetic field whatever to choke back the current, thereby permitting the latter to rush out unconfined and unrestrained toward its natural outlet; but as the lines of the magnetic field are constantly maintained with maximum impedance at the periphery of the coil and remain surrounding the peripheral turns until the very last moment of the fall due to the break in the circuit their presence there prohibits any possibility of manifestation of the rise of the potential in the current at that end of the coil, so that all the increase of potential in the whole coil is obliged to find an outlet from the center, and the ease of outflow from this outlet increases as the lines of force fall away from the center, thereby removing their restraining and impeding influence therefrom. This will be clear by bearing in mind the action which takes place in what is commonly called a "choke-coil"—*i. e.*, a winding about an iron core, said winding being in a spiral from one end of the iron to the other. In such a coil it is obvious that when a current passes the lines of force rise equally along the extent of the entire coil and that when the current is broken the lines of force fall directly in, perpendicular to the core, thereby cutting each turn of the spiral equally and at the same time, thereby producing high pressure at both ends of the choke-coil, the potential being necessarily the same at both ends of the wire, because both ends are affected by the same conditions of falling lines of force.

In my coil the lines of force do not fall equally on all the turns; but there is a minimum intensity at the center and a maximum intensity at the periphery, the latter being the point of entrance of the current, so that the current due to self-induction is always free to be drawn off, as it were, into the condenser at one end as fast as it is developed and is prevented from departing at the opposite end, or, stated in other words, while the current from the dynamo is always free to flow into the coil for having its potential raised the said potential must all seek its outlet at the opposite end of the coil, so that all the current of the coil flows therefrom into the condenser, whereas in a choke-coil the induced current may be said to ooze out at both ends, so that the benefit is not received of all that is developed.

By my coil all the lines of force are collected for cutting from the center across the entire coil, whereas in the usual choke-coil the lines of force that fall at the center cut only the central turns, so that in my coil I develop all the potential that is possible to be developed.

I regard it as a new principle to withdraw the lines of magnetic force away from that portion of the coil from which the current is being drawn and maintain a magnetic field at that portion of the coil which receives the current.

Other features of construction to be noted in the coil shown in Fig. 1 are that the high-potential end of the coil is that portion of least resistance, because the central turns are of course shorter than the peripheral turns. The resistance in the coil diminishes as the potential increases; also, it will be observed that I have given the magnetic core substantially the form of a semicircle in cross-section, my reason for this form being that thereby the lines of magnetic force are given their best radiation or are distributed to the best effect on the coil, it being understood that these lines leave the iron perpendicular to its surface and are gradually bent around toward the coil.

Referring now to the break D, (best shown in Figs. 2 and 3,) I journal in a central post or bearing d the spindle d' of an iron plate or armature d^2, having two or more eccentric edges d^3, as clearly shown in Fig. 2, or other provision of regions of increasing magnetic attraction. Mounted on or otherwise connected to rotate therewith are one or more small antifriction-rolls d^4, two being herein shown mounted at the opposite ends of a bar d^5, clamped adjustably on the plate d^2. These rolls or circuit-interrupters are preferably of indurated fiber. Mounted to extend into the path of the rolls d^4 is an arm (shown as a wire d^6) carrying a hammer d^7 to contact with an anvil d^8 on a post d^9 and limited in its movement by a fiber stop d^{10} on the end of an adjusting-screw d^{11}. The wire d^6 is carried by a hub d^{12}, loose on a pin d^{13} and held under tension by a spring-coil d^{14}, Fig. 3, fastened at one end to said hub and at its other end to a nut d^{15}, carrying an adjusting or set screw d^{16}, so that by loosening the set-screw and swinging its handle one way or the other the resistance of the arm d^6 may be varied. Opposite the surfaces d^3 I place solenoids or electromagnets d^{17} d^{18}, operated by taps d^{19} from the main circuit entering the solenoids at their inner terminals, so that as the magnets d^{17} d^{18} are energized they attract the plate d^2, and by the increasing pull exerted thereon on account of the eccentric surfaces d^3 they cause the plate to rotate with a speed only checked by the striking of the interrupters d^4 against the end of the arm d^6, said rolls being placed relatively to the highest points of the surfaces d^3, so that they cut off the current just before said highest points get opposite the propelling-magnets, thereby permitting the momentum of the plate or armature d^2 to carry said highest points beyond the magnets sufficiently to prevent the latter exerting any retarding influence on the rotation of the break. Preferably I mount the anvil and hammer on a swinging ledge or carrier d^{20}, journaled on the post d, so that I am enabled to regulate the speed of the break simply by swinging the carrier d^{20} one way or the other. The same effect may be obtained by shifting the roll or rolls d^4 on the plate d^2, provided they are carried, as preferred, on a bar d^5, so that they can be shifted; but this adjustment cannot of course take place while the apparatus is in operation, and therefore for instantaneous regulation of the apparatus and of the system I provide the swinging carrier d^{20}. A movement of the carrier from right to left in the diagram causes the current to be broken before the armature has reached its point of greatest attraction, and as it is moved farther toward the left the pull on the armature exerted by the magnets is diminished more and more and the speed of rotation of the armature is correspondingly reduced, thereby reducing the number of breaks and at the same time lengthening the time which the circuit of the inductance-coil is closed. This is of great importance, because thereby it results that the degree of magnetic saturation of the core or field b^3 may be increased up to its highest limit.

I place the arm or wire d^6 slightly tangential to the armature, as will be seen viewing Fig. 2, in order that the rolls d^4 may strike the extreme end thereof with least friction, striking outward instead of square against the end.

The mains b^4 b^5, Fig. 1, are connected, as stated, to the break by the conductors b^6 b^7, and in order that the condenser may not discharge back through the break I interpose in these conductors a resistance, herein shown as consisting of a few small turns b^8. The discharge from the condenser will seek the path of least resistance, and therefore I interpose just sufficient resistance at b^8 to prevent said discharge acting through the break, but not enough to render the condenser inoperative. One object of this special break is to make it possible to get all the efficiency out of the inductance apparatus B that there is. This would be impossibe with any usual break, for the reason that if a usual break were used, so as to give an equivalent period in which the circuit was closed, the brush would remain upon the surface of the break, tending through the heat or friction engendered to arc upon it, so that the condenser could not receive the full charge from the inductance-coil, but a portion would be lost upon the break-surface. My break, however, gives an absolutely instantaneous break, this break, moreover, being of extremely short duration, so that in practice I am enabled to leave the circuit closed during thirty-five thirty-sixths of the period of rotation of the break-armature, thereby leaving the inductance-coil B all of this period in which to raise its potential. It will be understood that as the point of highest saturation of the core is approached the discharge into the condenser is much greater in volume than if the magnetic flux were not complete.

In my break there is not only no chance for it to arc, as there is no surface for it to arc over, but the break itself is so exceedingly quick that there is not even a spark at the time of break, but there is merely occasionally a residual spark upon the closing of the break. Thus I am enabled to avoid entirely the considerable loss of energy heretofore consumed by the break, and I am enabled by the use of this break, in connection with the special inductance-coil B, to charge the condenser with an amperage which has not been possible in any system heretofore. Also by reason of the spark-gap G, which I will now describe, I am enabled to maintain the condenser action at the maximum charge and without any danger of breaking it down.

I provide electrodes in the form of opposite parallel disks g g', the air-gap between whose plane surfaces constitutes the spark-gap, the extended area of these electrodes preventing the tendency of the condenser to discharge until it has reached its maximum charge, and also causing the discharge to be exceedingly sudden when it does take place and the disks not being liable to become unduly heated. The spark-gap G constitutes virtually a self-recuperative or indestructible condenser, as it were, the parallel and preferably plane metallic surfaces g g' being the discharge-surfaces which discharge through or across the intervening air-dielectric. The air-gap is broken through when the voltage has exerted a sufficient strain upon the air to rupture it. The larger the disks are the farther apart they will spark. At each discharge of the condenser a small portion of these plates is oxidized, the successive discharges producing very thin oxidation here and there until the entire surfaces of the two disks are completely oxidized. Referring to Figs. 5 and 6 for the details of this spark-gap, it will be seen that I provide a plurality of posts g^2, threaded at their upper ends and carrying shouldered nuts g^3, on the shoulders of which is placed the top disk g', being held accurately on said shoulders by a spring g^4 under a tension-nut g^5, said nut and spring being mounted on the reduced end of a central post g^6, over which the plates g g' are placed. The opposite plate g rests on a support or table g^7, provided on its under side with a plurality of recesses or sockets g^8, herein shown as three in number, which receive props or struts g^9, projecting upwardly from the base g^{10} of the instrument. These props g^9 are of precisely equal length, so that they support the plate g in absolute parallelism to its opposite plate g'. The support g^7 has depending from its lower side a stud g^{11}, which is engaged by the bifurcated end g^{12} of a lever g^{13}, pivoted at g^{14} to a post g^{15} on the base. By this provision the most delicate adjustment is possible simply by swinging the lever g^{13} one way or the other, so as to incline the struts g^9 more or less, and thereby increase or decrease the distance between the plates g g', the nuts g^3 being depended upon for the coarser adjustments of the plates.

I have shown the plates g g' as hollow and provided with water-circulation pipes g^{16} in order that they may be absolutely prevented from all heating under extraordinary conditions.

The induction-coil E comprises a primary e of large cross-sectional area, capable of receiving a considerable amperage, the secondary e' being wound on the principle explained in connection with the coils b b', so that its inner terminal alone has the high-potential discharge, the other terminal having comparatively no discharge. I do not herein claim this induction-coil, inasmuch as it forms the subject of another application and is therein claimed; nor will I herein further describe the details thereof, merely showing this particular coil for the reason that this is the only coil known to me which can be used for obtaining the best results from my system; nor do I herein claim the special break device, nor the special spark-gap, inasmuch as these form the subjects-matter of other applications, Serial Nos. 691,757 and 691,758, filed September 24, 1898, and are therein claimed, and it will accordingly be understood that while these particular instruments are preferably employed in my system I do not intend to restrict the latter thereto, nor otherwise than as expressed in the following claims. The conditions that are obtained in this system make it possible to discharge currents of enormous strength with great velocity through the primary, the velocity obtained making it possible to raise the potential in the secondary enormously, and the said potential being confined to one terminal only a resulting discharge is obtained representing the total of the potential that otherwise would be manifest at both terminals of an ordinary coil.

The spark-gap G is adjusted to the point of discharge of the condenser which it is desired the latter should maintain, and accordingly said condenser is automatically discharged as often as it rises to said point of maximum charge, and it can never be overcharged, for the reason that the spark-gap remains unvarying.

The use of the plates g g' makes possible the sudden discharge of the condenser after it has reached the certain predetermined point mentioned, and said discharge is of great volume or large amperage and of a very sudden and abrupt nature, as the current will not break across the spark-gap until it cannot help doing so, and when it does do so the discharge takes place with a minimum heating effect, not interfering with the efficiency, with very rapid and with very short and sharp oscillations, incapable of being obtained between a ball or point discharge-gap and productive of very great results in the secondary.

The plates g g' of the gap G are adjusted to the potential at which it is desired the condenser C shall discharge, and then the break D is regulated to give the volume or amperage of current which it is desired shall charge the condenser, the latter being automatically discharged as frequently as its charge reaches the predetermined limit to which the spark-gap has been adjusted. For example, supposing that the break D is adjusted so as to require the inductance device B to operate at its saturated point, as before explained. Then the number of discharges of the condenser across the spark-gap during each fluctuation in the coil B will be many more times than if the break D were operating more rapidly, and hence the rapidity of the discharge from the induction-coil E is increased in its efficiency, giving more volume of discharge.

It must be understood that the potential that is developed in the induction-coil E is not as great when the plates g g' are brought near together as it is when they are far apart, because in the latter case the condenser charge becomes greater necessarily before it is discharged. By increasing the length of the spark-gap, the speed of the break remaining the same, I get an increase of potential in the oscillator or induction-coil E, and also I may obtain the same effect without varying the length of spark-gap by decreasing the speed of the break.

The maximum potential obtainable from the induction-coil is when the break is adjusted to rotate at a speed sufficient to permit the saturation of the core b^3 and the spark-gap at G is lengthened so that the condenser is allowed to charge to its full capacity.

The sudden opening of the break-gap wide enough so that no discharge may take place thereat, but all the charge seeks a much better channel of discharge in the condenser, taking place as it does in an exceedingly small interval of the period of rotation of the break, gives the inductance-coil B volume of discharge such that it may charge the condenser a considerable number of times before another break takes place; or, to put this in another way, my apparatus enables me to produce a charge from the device B of such enormous volume that the spark-gap G will be called upon to automatically discharge the condenser a number of times during the interval of one falling of the lines of force in the inductance device B.

I regard myself as the first to provide an induction system capable of automatically regulating itself so as to maintain a given discharge, and I also believe myself to be the first to provide an apparatus capable of maintaining said condenser-discharge at a given amperage.

The frequency by my system is practically unlimited, inasmuch as a plurality of inductance devices B may be connected independently to the break D and condenser C, merely being arranged to operate out of step with each other, and there will be no danger to the condenser, for the reason that the spark-gap G will take care of all the charge which may be delivered to the condenser.

My system enables me to use a small condenser and yet with enormous efficiency therefrom.

While I have herein described preferred embodiments of my invention, I do not restrict myself thereto. For example, the electromagnets d^{17} d^{18} need not be used; but instead thereof the inductance device B may be oppositely wound, as indicated in Fig. 4, so that the core b^9 will be properly located for running the armature d^2 of the break. In this case I make the ends of the core b^9 hemispherical, thereby obtaining the same advantage before explained in connection with the similarly-shaped surfaces of the core b^3, and the coils b^{10} b^{11} will be wound back and forth transversely in the same manner as the coils b b', the difference being that in this case the inner terminal becomes the low-potential end of the coils for connection to the dynamo and the outer terminals are the high-potential ends of the coils for connection to the condenser, this form of apparatus, however, not being so efficient as the form previously described, for the reason that the outer or longer turns present an increased resistance to the higher potential, whereas the best effects can be obtained, as before explained, by presenting a decreasing resistance to an increasing potential.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a system of the kind described, an electric circuit, means including a condenser to impress thereon a current of high frequency, combined with means for automatically discharging the condenser at any predetermined degree of charge, and means for varying the amperage charge of the condenser, substantially as described.

2. In a system of the kind described, a source of electrical energy, and a condenser, combined with a device for raising the potential of the current, means for discharging said raised potential solely in one direction from said device, and means for controlling the potential of said device, substantially as described.

3. In a system of the kind described, a source of electrical energy, a break, condenser, and a translating device to receive the discharge from the condenser, combined with means for preventing the discharge of the condenser back through the break, substantially as described.

4. In a system of the kind described, the combination with a source of electrical energy, a break, and condenser, of an inductance device between said source of energy and the break, said device having a magnetic core, and coils in the influence of said core and wound to present high potential at one end and low potential at the other end, said coils having their low-potential terminals connected to the source of energy, and their high-potential terminals connected to the condenser, and interrupted by the break, substantially as described.

5. In a system of the kind described, the combination with a source of electrical energy, a break, and condenser, of an inductance device between said source of energy and the break, said device having a core producing a magnetic field, and coils in the influence of said field and wound to present high potential at one end and low potential at the other end, said coils having their low-potential terminals connected to the source of energy, and their high-potential terminals connected to the condenser, and interrupted by the break, and means to vary the degree of magnetic saturation of said field in the operation of the system, substantially as described.

6. In a system of the kind described, a source of electrical energy, a break, and a condenser, combined with means independent of the break for automatically regulating the frequency of discharge from said condenser, substantially as described.

7. In a system of the kind described, a source of electrical energy, an inductance device for raising the potential of the current therefrom, said device delivering said potential in one direction only and away from the source of energy, a break provided with means for maintaining long intervals of closed circuit, and sudden short intervals of break, a condenser, and an automatic discharge device for said condenser, substantially as described.

8. In a system of the kind described, a source of electrical energy, an inductance device for raising the potential of the current therefrom, said device delivering said potential in one direction only and away from the source of energy, a break provided with means for maintaining long intervals of closed circuit, and sudden short intervals of break, a condenser, means preventing back discharge from the condenser and sparking at the break, and an automatic discharge device for said condenser, substantially as described.

9. The combination in an electrical circuit, of an inductance-coil having a core producing a magnetic field and wound to present a high-potential region at one end and low-potential region at the other end, the terminal thereof connected with the source of current-supply being at said low-potential region, and the opposite terminal being at said high-potential region, said coil having the potential thereof decreasing in a constant ratio from the one to the other terminal, and mechanism for interrupting the said circuit, said mechanism comprising means for maintaining the circuit closed in periods sufficient to fully charge said magnetic field, substantially as described.

10. An inductance-coil comprising a core, and a winding of current-conductor centrally of said core, said winding being in two coils, each having one terminal adjacent said core and the other terminal removed from said core, with all the windings of the coil located between said two terminals, and said coil having its potential varying per turn progressively in a constant ratio throughout its length from one terminal to the other terminal, substantially as described.

11. In an inductance-coil, a peripheral core or magnetic body, and a winding of current-conductor within the field of said magnetic body, said conductor being wound to present

its successive layers of windings successively shorter from the periphery to the center of the coil throughout the entire length of the conductor, substantially as described.

12. In an inductance device, a magnetic core, and a coil adjacent thereto, said core presenting curved surfaces adjacent the coil curving therefrom in a direction away from the coil, whereby the lines of magnetic force leaving the core perpendicular to said surfaces are widely distributed about the coil, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
FREDERICK L. EMERY.

No. 623,317. Patented Apr. 18, 1899.

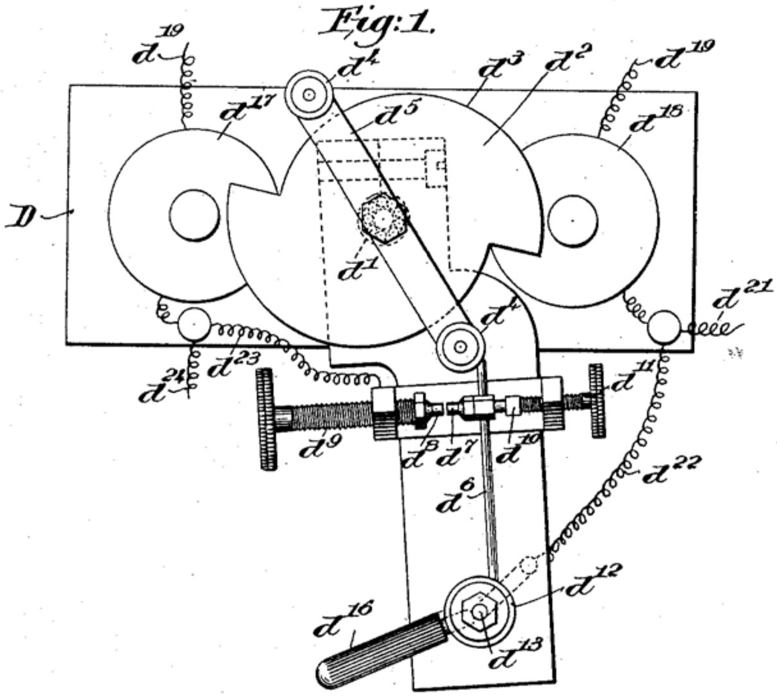
T. B. KINRAIDE.

ELECTRICAL BREAK.

(Application filed Sept. 24, 1898.)

(No Model.)

Fig: 1.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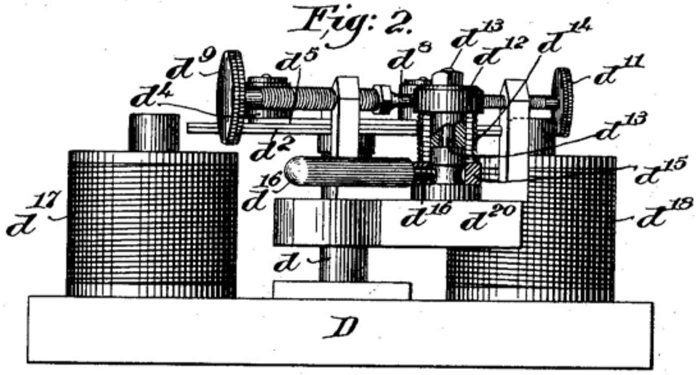
d^{13}

Fig: 2.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d^{20}
d^{18}
d
D

Witnesses,
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Fred S. Grundaf.

Inventor,
Thomas B. Kinraide,
by Crosby Gregory.
att'ys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

ELECTRICAL BREAK.

SPECIFICATION forming part of Letters Patent No. 623,317, dated April 18, 1899.

Original application filed May 5, 1898, Serial No. 679,799. Divided and this application filed September 24, 1898. Serial No. 691,757. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Electric Breaks, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present application is a division of my application, Serial No. 679,799, filed May 5, 1898.

Electric breaks as heretofore provided have been subject to considerable sparking, which is not only destructive of the apparatus, but is very objectionable in its effects on the current and system being operated, this being especially true of rotary breaks which operate by means of a brush in frictional engagement with a rotating surface. Accordingly I have invented a break in which there is no chance for arcing, as there is no surface to arc over, and also a leading object of my break is to provide a means for making an exceedingly quick break with a relatively long period of closed circuit, my break rendering it possible to regulate the period of closed circuit accurately. Many considerable advantages resulting from this construction will occur to those skilled in the art.

The details of construction and principles of operation of my improved break will be more fully pointed out in the following description, reference being had to the accompanying drawings, in which I have illustrated a preferred embodiment of my invention, and the latter will be more particularly defined in the appended claims.

In the drawings, Figure 1 is a top plan view of one form of my break. Fig. 2 shows the same in elevation.

On a suitable base D, I journal, in a central post or bearing d, a spindle d' of an iron plate or armature d^2, having two or more regions of varying mass of magnetic material, herein shown in the form of eccentric edges d^3, as clearly shown in Fig. 1.

My object is to provide regions of increasing magnetic attraction to coöperate with one or more suitable electromagnets or solenoid devices so located as to successively attract these regions of varying mass of magnetic material for rotating the armature, as will now be explained.

Mounted on or otherwise connected to rotate with the armature d^2 are one or more small antifriction-rolls d^4, two being herein shown mounted at the opposite ends of a bar d^5, clamped adjustably on the plate d^2. These rolls or circuit-interrupters are preferably of indurated fiber.

Mounted to extend into the path of the rolls d^4 is an arm, (shown as a wire d^6,) carrying a hammer d^7 to contact with an anvil d^8 on a post d^9 and limited in its movement by a fiber stop d^{10} on the end of an adjusting-screw d^{11}. The wire d^6 is carried by a hub d^{12}, loose on a pin d^{13} and held under tension by a spring-coil d^{14}, Fig. 2, fastened at one end to said hub and at its other end to a nut d^{15}, carrying an adjusting or set screw d^{16}, so that by loosening the set-screw and swinging its handle one way or the other the resistance of the arm d^6 may be varied.

Preferably adjacent the periphery of the armature d^2 I place attracting means, herein shown in the form of solenoids or electromagnets d^{17} d^{18}, connected with the main or other source of current by wires d^{19}, which enter the solenoids at their inner terminals, so that as the magnets d^{17} d^{18} are energized they attract the armature or plate d^2, and by the increasing pull exerted thereon on account of the eccentric surfaces d^3 they cause the plate to rotate with a speed only checked by the striking of the interrupters d^4 against the end of the arm d^6, said rolls being placed relatively to the highest points of the surfaces d^3, so that they cut off the current just before said highest points get opposite the propelling-magnets, thereby permitting the momentum of the plate or armature d^2 to carry said highest points beyond the magnets sufficiently to prevent the latter exerting any retarding influence on the rotation of the break.

Preferably I mount the anvil and hammer on a swinging ledge or carrier d^{20}, journaled on the post d, so that I am enabled to regulate the speed of the break simply by swinging the carrier d^{20} one way or the other. The same effect may be obtained by shifting the roll or rolls d^4 on the plate d^2, provided they are carried, as preferred, on a bar d^5, so that they can be shifted. This adjustment cannot of course take place while the apparatus is in operation, and therefore for instantaneous regulation of the apparatus I provide the swinging carrier d^{20}.

A movement of the carrier from right to left causes the current to be broken before the armature has reached its point of greatest attraction, and as it is moved farther toward the left the pull on the armature exerted by the magnets is diminished more and more, and the speed of rotation of the armature is correspondingly reduced, thereby reducing the number of breaks and at the same time lengthening the time which the circuit being interrupted is closed.

I place the arm or wire d^6 slightly tangential to the armature, as will be seen viewing Fig. 1, in order that the rolls d^4 may strike the extreme end thereof with least friction, striking outward instead of square against the end. The arm d^6 is connected to the main or branch therefrom at d^{21} by means of any suitable conductor d^{22}, and the anvil d^8 has a connection d^{23} to the delivery end d^{24} of the circuit, as will readily be understood.

In operation the magnets being energized attract the eccentric surfaces or other varying masses of magnetic material, so as to cause the armature to rotate over to the left, Fig. 1, the circuit being completed at d^7 d^8 until the very moment when the interrupter d^4 strikes the free end of the arm d^6, whereupon the circuit is instantaneously broken, and as this time occurs slightly before the highest points or places of greatest attraction of the armature come opposite the solenoids the latter are rendered inactive merely during the moment when the momentum of the armature is carrying the latter by the solenoids, so as to bring the region of least magnetic mass again opposite the solenoids in position for the latter, upon becoming active by the making again of the circuit, to renew their pull upon the armature, and thereby continue its rapid revolution. This action is rapidly repeated at every make and break of the instrument.

I prefer to provide opposite solenoids in order to render the device perfectly balanced and smooth-running, although it will be understood that variations in this and in all other details of my invention may be made.

By the use of my invention the time-period of closed circuit may be made as considerable as desired. With any usual break this would be impossible, for the reason that in order to give an equivalent period of closed circuit the brush would of necessity remain upon the surface of the break so long as to heat frictionally the surfaces, so as to produce a constant arc, ultimately destroying the break as well as the efficiency of the circuit. In my break there is not only no chance for it to arc, as there is no surface for it to arc over, but the break itself is so exceedingly quick that there is not even a spark at the time of break, but there is merely occasionally a residual spark upon the closing of the break.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An electric break comprising a rotating member, an electromagnet, a break device, and means driven by said rotating member for interrupting said break device, said rotating member presenting a surface of attraction to said magnet eccentric to the center of rotation of said member, substantially as described.

2. An electric break comprising a rotating member, an electromagnet, a break device, and means driven by said rotating member for interrupting said break device, said rotating member presenting a surface of attraction to said magnet eccentric to the center of rotation of said member, and means for varying the time of interruption of said break device relatively to the point of highest attraction of said eccentric surface, substantially as described.

3. An electric break comprising a rotating member, an electromagnet, a spring, a break device, means to vary the resistance of said break device, and means driven by said rotating member for interrupting said break device, said rotating member presenting a surface of attraction to said magnet eccentric to the center of rotation of said member, and means for varying the time of interruption of said break device relatively to the point of highest attraction of said eccentric surface, substantially as described.

4. An electric break comprising a rotating member having regions of varying mass of magnetic material producing regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and an interrupter driven by said rotating member for interrupting the break device, substantially as described.

5. An electric break comprising a rotating member having regions of varying mass of magnetic material producing regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and an interrupter carried by said rotating member for interrupting the break device, substantially as described.

6. An electric break comprising a rotating member having regions of varying mass of magnetic material producing regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and a pivoted roll carried by said rotating member for interrupting the break device, substantially as described.

7. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and a pivoted roll carried by said rotating member for interrupting the break device, and means

for adjusting said roll on said rotating member, substantially as described.

8. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and a bar fixed on said rotating member and provided with rolls pivoted thereon at its opposite ends in line with and to interrupt said break device, substantially as described.

9. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and an interrupter carried by said rotating member for interrupting the break device, said break device being mounted on a carrier movable concentrically to said rotating member, substantially as described.

10. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and a revolving interrupter driven by said rotating member, said break device including a yielding arm projecting obliquely into the path of said interrupter, substantially as described.

11. An electric break comprising an arm carrying a hammer, an anvil opposite said hammer, said arm being yieldingly supported and provided with means for regulating the tension or resistance thereof, an interrupter for engaging the free end of said arm, and automatic means operated by the current being broken for driving said interrupter, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
ALEXANDER C. PROUDFIT.

No. 623,318. Patented Apr. 18, 1899.

T. B. KINRAIDE.

ELECTRICAL SPARK GAP.

(Application filed Sept. 24, 1898.)

(No Model.)

Fig:1.

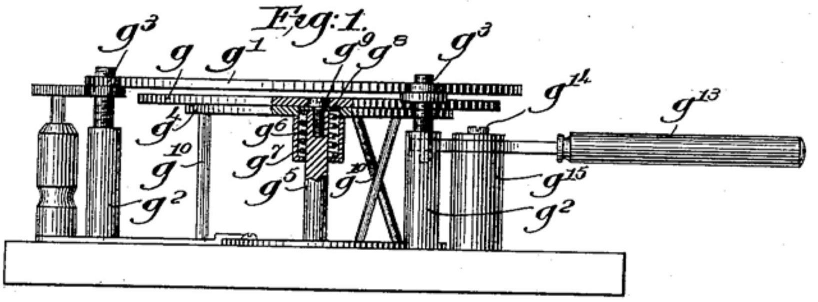
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Fig:3.

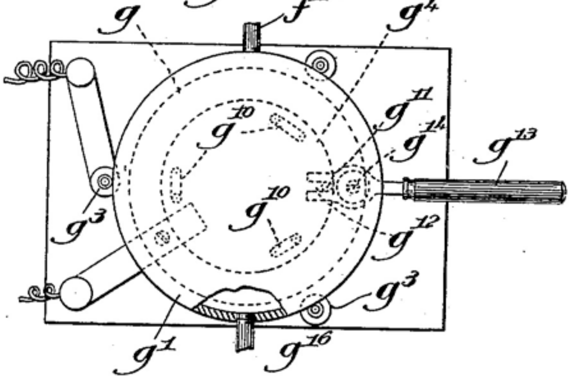
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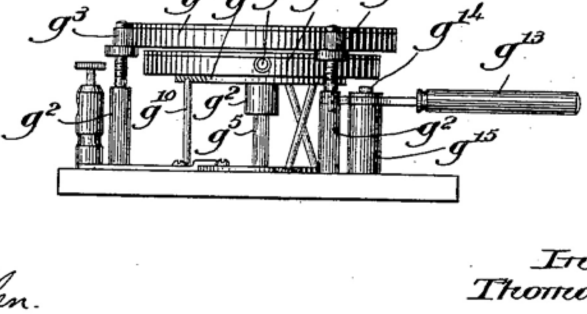
Fig:2.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Witnesses,
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James M. Urquhart.

Inventor,
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by Crosby Gregory
Att'ys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

ELECTRICAL SPARK-GAP.

SPECIFICATION forming part of Letters Patent No. 623,318, dated April 18, 1899.

Application filed September 24, 1898. Serial No. 691,758. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Electric Spark-Gaps, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The more recent developments in electrical matters, and particularly in the line of experimental research in connection with static electricity, have developed conditions requiring the discharge of such enormous potentials and amperage as to render the apparatus heretofore provided for such purposes inefficient and largely useless, for the reason that these enormous discharges which the electrician frequently desires to experiment or deal with very quickly render inoperative or destroy such usual apparatus.

Accordingly it is the object of my present invention to provide a practically indestructible discharge apparatus to meet the more exacting requirements of the present day; and to that end I provide a spark-gap which is virtually self-recuperative and comprises opposite parallel discharge-surfaces of considerable area, which, besides their practically indestructible character, possess numerous very important advantages, all as will be more fully pointed out in the course of the following detailed description of the apparatus, reference being had to the accompanying drawings, illustrative of preferred embodiments thereof.

In the drawings, Figure 1 represents in side elevation a simple form of my improved spark-gap. Fig. 2 is a similar view showing a modification. Fig. 3 is a top plan view of the form of apparatus shown in Fig. 2.

While the spark-gap which constitutes my invention and which I will now describe is primarily intended for use in discharging condensers, as shown in my application, Serial No. 679,799, filed May 5, 1898, it will be understood that it is not limited thereto, but may be employed in various other relations.

I provide electrodes preferably in the form of opposite parallel disks g g', the air-gap between whose plane surfaces constitutes the spark-gap, the extended area of these electrodes preventing the tendency of the condenser, for example, to discharge until it has reached its maximum charge and also causing the discharge to be exceedingly sudden when it does take place and the disks not being liable to become unduly heated.

The spark-gap constitutes virtually a self-recuperative or indestructible condenser, as it were, the parallel and preferably plane metallic surfaces g g' being the discharge-surfaces, which discharge through or across the intervening air dielectric. The air-gap is broken through when the voltage has exerted a sufficient strain upon the air to rupture it. The larger the disks are the greater condenser capacity will they have, and hence the farther apart they will spark.

At each discharge of the condenser a small portion of the plates g g' is oxidized, the successive discharges producing very thin oxidation here and there until the entire surfaces of the two disks are completely oxidized. Suitable means is provided for accurately adjusting these plates relatively to each other and regulating their distance apart, or, in other words, for controlling the resistance of the intervening gaseous dielectric, and, referring to the drawings, where I have shown a preferred means for accomplishing my object, it will be seen that I provide a plurality of posts g^2, threaded at their upper ends and carrying shouldered nuts g^3, on the shoulders of which is placed the top disk g'. The opposite plate g rests on a support or table g^4 and is mounted loosely on a post g^5, being normally held downwardly by a spring g^6, contained in a hanger or housing g^7, depending from the table g^4, said spring bearing at one end against the flanged lower end of the hanger g^7 and at its other end bearing against a washer g^8, retained by a screw g^9, whose head enters a hole or recess in the plate g for centering the latter.

The plate g is provided on its under side with a plurality of recesses or sockets, herein shown as three in number, which receive props or struts g^{10}, projecting upwardly from the base of the instrument. These props g^{10} are of precisely equal length, so that they support the plate g in absolute parallelism to its opposite plate g'. The support g^4 has depending from its lower side a stud g^{11}, which is engaged by the bifurcated end g^{12} of a lever g^{13}, pivoted at g^{14} to a post g^{15} on the base.

By this provision the most delicate adjustment is possible simply by swinging the lever g^{13} one way or the other, so as to incline the struts g^{10} more or less, and thereby increase or decrease the distance between the plates g g', the nuts g^3 being depended upon for the coarser adjustments of the plates.

In Figs. 2 and 3 I have shown the plates g g' as hollow and provided with water-circulation pipes g^{16} in order that they may be absolutely prevented from all heating under extraordinary conditions. Under usual conditions, however, this provision is entirely unnecessary, it being sufficient simply to provide the plates, as shown in Fig. 1.

When the adjacent surfaces of the plates have become entirely oxidized, the plates may be turned over and their opposite sides used, and when both sides have become oxidized they may be readily removed and scoured off without destroying any of their adjustments.

My apparatus makes possible the sudden discharge of a condenser after the latter has reached a certain predetermined point, and said discharge is of great volume or large amperage and of a very sudden and abrupt nature, as the current will not break across the spark-gap until it cannot help doing so, and when it does do so the discharge takes place with a minimum heating effect, not interfering with the efficiency, with very rapid and with very short and sharp oscillations incapable of being obtained between a ball or point discharge gap.

The adjustment of the plates relatively to each other regulates the amperage-discharge of the instrument being discharged.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A spark-gap of the kind described for use in a condenser-circuit, said spark-gap presenting opposite parallel discharge-surfaces of relatively large areas and means for regulating the discharge distance between said parallel surfaces, whereby a condenser charge may be automatically governed, substantially as described.

2. The herein-described spark-gap comprising opposite electrodes presenting parallel discharge-surfaces, one of said electrodes being supported on three or more struts of equal length, and means for rotating said strut-supported electrode about its center, whereby its adjustment may be varied to and from the opposite electrode, substantially as described.

3. A spark-gap, comprising two permanent large superficial areas parallel to each other, constituting opposite discharge-surfaces, and an interposed gaseous dielectric, said discharge-surfaces having condenser capacity for breaking down the intervening dielectric, and the latter automatically restoring or renewing itself, substantially as described.

4. A spark-gap comprising opposite hollow plates or disks having parallel discharge-surfaces, means for regulating the discharge distance between said surfaces, and circulation-pipes entering the same, whereby a circulation of water may be maintained for keeping the plates or disks cool, substantially as described.

5. A spark-gap comprising three or more posts, shoulders adjustable thereon, a plate or disk supported on said shoulders, a second plate below the same, a support therefor, three or more upright struts loosely engaging said support, and means to rotate said support about its center, whereby said struts are simultaneously and similarly moved for varying the distance apart of said plates, substantially as described.

6. A spark-gap comprising a central post, a plurality of supporting-posts, two plates, one carried by said supporting-posts and the other adjacent said central post, three or more similar struts supporting said lower plate, a spring maintaining said struts in proper supporting relation, and means to rotate the lower plate on said central post, substantially as described.

7. A spark-gap comprising a plurality of supporting-posts, two plates, the lower plate being pivotally mounted, three or more similar struts supporting said lower plate, and the upper plate being supported by said supporting-posts, a lever pivotally mounted adjacent said lower plate and loosely connected therewith at its inner end for rotating said plate and tipping said struts, substantially as described.

8. A spark-gap comprising a central post, a plurality of supporting-posts, two plates, the lower plate being pivotally mounted concentrically to said central post, a hanger depending adjacent said post, a spring between said post and hanger and engaging the hanger at its lower end and held by the post at its upper end, three or more similar struts supporting said lower plate, and the upper plate being supported by said supporting-posts, a lever pivotally mounted adjacent said lower plate and loosely connected therewith at its inner end for rotating said plate and tipping said struts, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:

GEO. H. MAXWELL,
ALEXANDER C. PROUDFIT.

No. 676,583. Patented June 18, 1901.

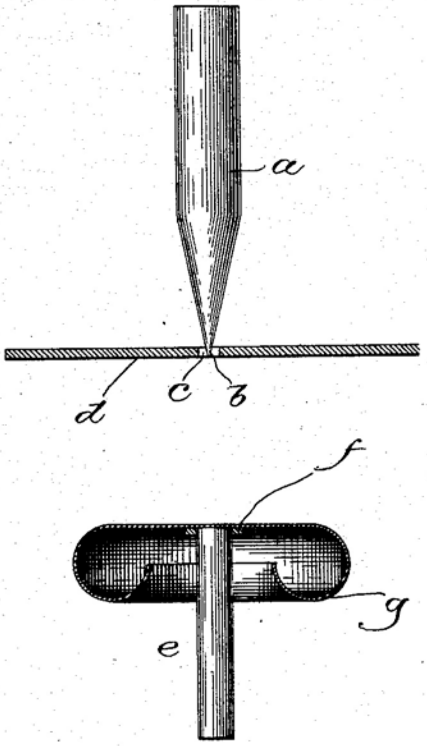
T. B. KINRAIDE.

ELECTRICAL APPARATUS.

(Application filed Aug. 13, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1



Witnesses.
Thomas J. Drummond.
Adolf C. Kaiser

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 676,583. Patented June 18, 1901.

T. B. KINRAIDE.

ELECTRICAL APPARATUS.

(Application filed Aug. 13, 1900.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

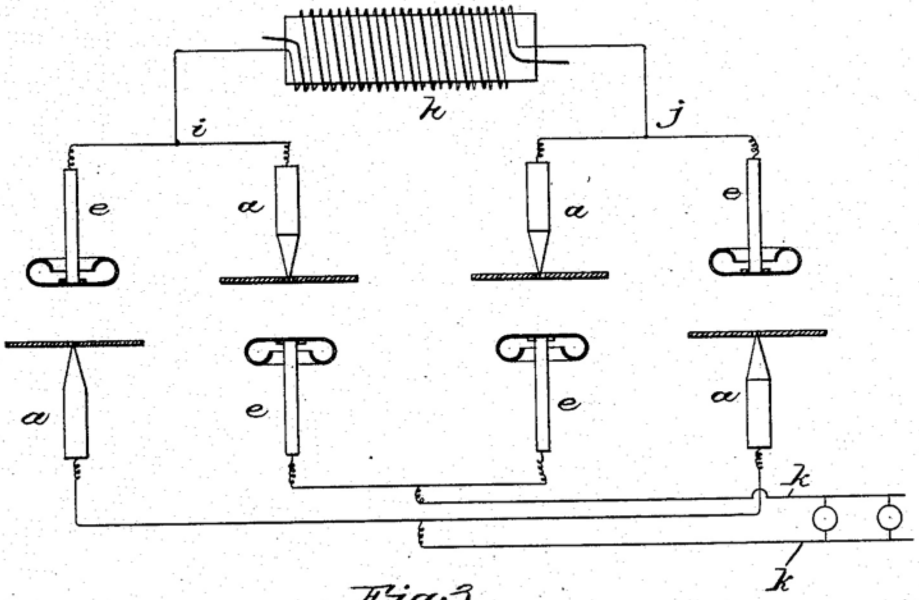
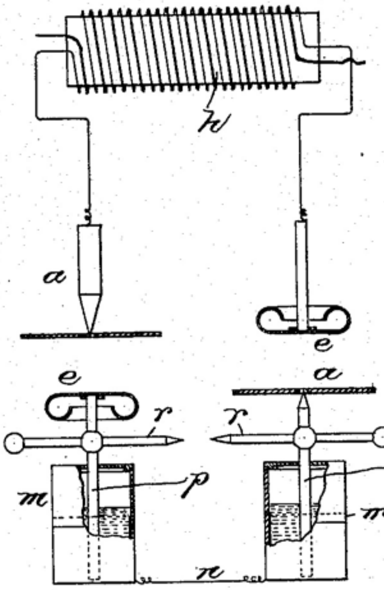


Fig. 3.



Witnesses.
Thomas J. Drummond.
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Inventor.
Thomas B. Kinraide,
By Crosby Gregory
Att'ys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

ELECTRICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 676,583, dated June 18, 1901.

Application filed August 13, 1900. Serial No. 26,709. (No model.)

To all whom it may concern:

Be it known that I, THOMAS BURTON KINRAIDE, a citizen of the United States, and a resident of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Electrical Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention is of wide application to various kinds of electrical apparatus and embodies certain important discoveries which I have made whereby I am enabled to positively maintain an electrical discharge in one direction only and under proper conditions to maintain said discharge continuously, producing, for instance, without the intervention of a commutator a continuous current directly from an alternating or intermittent current. Without necessarily stating that such is the fact, it may be supposed that there is simply electrical energy and that the presence of said energy is what we call a "positive" condition, and the absence of said energy is what we call a "negative" condition, and this, taken with my discovery that electric energy in its positive condition discharges reluctantly from a plane (without edges or angular or pointed surfaces) and discharges with perfect freedom from a point, enables me to control the direction of discharge of the current, and hence the accumulation of potential. The requisite conditions are provided by means of what I term an "extensionless point," which provides, as nearly as it can be done mechanically, the ideal discharge-electrode or positive condition for the outward flow of the electrical energy, and by means of what I term a "limitless plane," which provides in the same manner the receptive electrode or negative condition, in which there may be said to be an absence of energy (or a lower potential than that of the point from which the discharge comes) corresponding to a vacuous condition or absence of electrical pressure. By this means the electrical energy tends to discharge continuously in one direction only—viz., from the extensionless point to the limitless plane.

In the drawings, in which I have illustrated, largely diagrammatically, one form of my invention, Figure 1 represents, partly diagrammatically and largely in vertical cross-section, two electrodes arranged to provide the conditions above explained. Fig. 2 illustrates the application thereof for transforming an intermittent current into a constant current. Fig. 3 illustrates the application of my invention to Leyden jars for converting an intermittent discharge into a continuous discharge.

The general structural features of my invention may be very briefly stated.

Referring to Fig. 1, it will be seen that the electrode *a* is pointed or pencil-shaped and that the extreme discharge-point *b* is in or projected slightly through a small aperture *c* in a rubber or other flat disk *d*, which extends at right angles thereto, the purpose of this disk being to cut off the attracting area which would otherwise be present in the converging walls or surfaces of the electrode *a*. By this means I provide an "extensionless point," speaking electrically. By this term I mean a point in which the attractive area of the electrode relatively to the opposite electrode is limited to the point itself, or, in other words, in which the rubber disk *d* shields all the surface of the rod or electrode behind the very point thereof. The rubber disk constitutes means for cutting off the receptive area about the discharge-point. Opposite the electrode point *b* is the receptive electrode *e*, which maintains a negative condition relatively to the electrode *a* and which I have termed the "limitless plane," speaking again electrically, this electrode having a large receptive area and being provided with means for preventing the tendency to discharge, said means residing in presenting a receptive surface or plane without angles or points, and this plane is secured by providing a flat surface *f* of considerable relative extent and curving its edges back and inwardly, as indicated at *g*, whereby, viewed electrically, the surface is limitless, inasmuch as it has no termination within the influence of the discharge-point *b*.

In operation, the positive energy discharges invariably from the point *b* to the plane *f*, and there is no discharge from the latter back to the point, one reason therefor being that the attraction of the limitless plane is compelling, there being practically no attraction in the opposite direction due to the shielded point.

Applying the invention to practical uses, it will be seen that its field is important and large.

In Fig. 2 I have indicated a typical source of intermittent or alternating energy in the form of an induction-coil *h*, (operated by an alternating current,) whose terminals *i j* are provided with electrodes *a e* of the kind already described, and opposite these electrodes, which are arranged in pairs, are complementary electrodes *e a*, connected to a working circuit *k*, which it is desired shall have a continuous current.

Remembering that, as already explained, the extensionless-point and limitless-plane electrodes compel the discharge to take place in one direction, it will be seen that the intermittent or alternating discharge from the coil *h* is automatically transferred into a continuous current by the lower sets of electrodes as arranged in Fig. 2.

Again referring for further illustration to Fig. 3, it will be seen that I have arranged two Leyden jars *m*, having their outer coatings electrically connected by a wire *n* and their inner coatings connected by posts *p*, in which are mounted usual discharge-rods *r*, said posts, however, being provided on their upper extremities with the electrodes *a e*, opposite electrodes *e a* at the terminals of a coil *h*, (operated by an interrupted current.) By this means it is possible to maintain constant discharge at an approximately fixed potential similar to the discharge from a static machine, as the intermittent discharge from the induction-coil, which is the source of supply for the Leyden jars, is enabled to keep the Leyden jars at a practically saturated point, so that the latter can maintain a constant discharge between their rods *r*. This application of my invention is of great practical importance for the electrical spinning of fine fibers, such as silk, the rapid evaporation of liquids, and the accomplishment of effects that can be produced by the continuous running of a static machine. The static machine necessarily leaks, is not subject to control, and is of necessity uncertain, whereas by my invention all these objections are removed and the static discharge is rendered continuous and uniform.

My invention is what might be called an "electrical check-valve," as it permits the unlimited discharge of the current in one direction, but checks it from discharging in the opposite direction.

In measuring the effectiveness of my invention I have found that upon arranging the source of supply in such a manner that a positive discharge could be compelled to pass from the electrode *e* to the electrode *b* the electrodes could only be one-quarter the distance apart that they could be when the current was passing in the opposite direction, and even then the current had to be forced or compelled to discharge, because, if possible, it would seek some other outlet in preference to the one desired for the sake of experiment.

It will be understood that the practical embodiment of my invention may be varied within a wide range of equivalent embodiments, and accordingly I do not limit myself otherwise than as is hereinafter expressed in the claims, nor do I limit myself in respect to the applications of my invention, as, for instance, it is useful as a spark-gap capable of definite control; also, for a lightning-arrester and a multitude of other uses.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The herein-described means for producing a continuous or unidirectional discharge, consisting of electrodes one of which has a discharge-point and is provided with means for cutting off the receptive area about said point, and another of which has a large receptive area provided with means for preventing the tendency to discharge, as set forth.

2. An electrode terminating in a comparatively fine point, and a flat shield extending approximately at right angles to said electrode and having a small aperture in which said point is located.

3. An electrode terminating in a plane, conducting-surface, having its edges curved or rolled rearwardly and inwardly.

4. In an electrical apparatus, a source of intermittent electrical energy having at its opposite terminals electrodes one of which has a discharge-point provided with means for cutting off the receptive area about said discharge-point and the other of which has a large receptive area provided with means for preventing the tendency to discharge, said means residing in presenting a receptive surface without angles or points, and other electrodes coöperating with said terminal electrodes, there being a discharge-point electrode arranged to coöperate with a receptive-area electrode and vice versa.

5. In an electrical apparatus, a source of intermittent electrical energy of high potential, means for compelling a unidirectional discharge from one end thereof, means opposite said end for receiving said discharge, said means being incapable, under ordinary conditions, of transmitting a back discharge, and means coöperating therewith for storing and maintaining said charge at an approximately fixed potential and maintaining a constant discharge therefrom.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
JOHN C. EDWARDS.

No. 689,199. **Patented Dec. 17, 1901.**

T. B. KINRAIDE.

ELECTRODE.

(Application filed May 2, 1901.)

(No Model.)

Fig. 1.

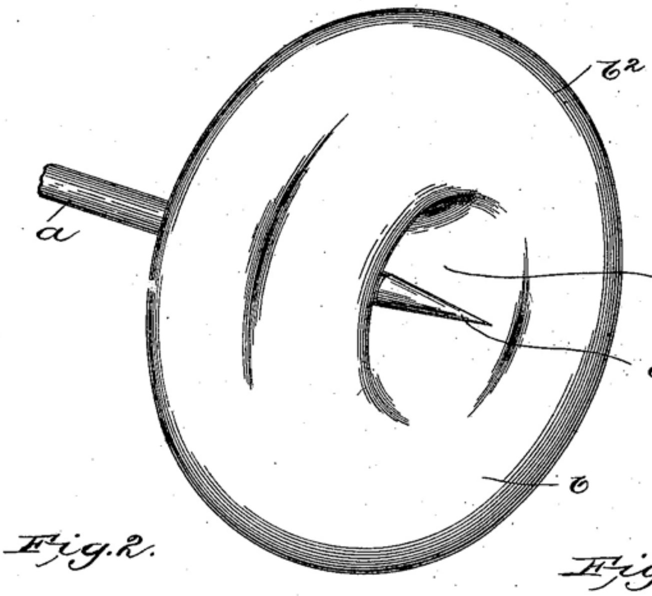
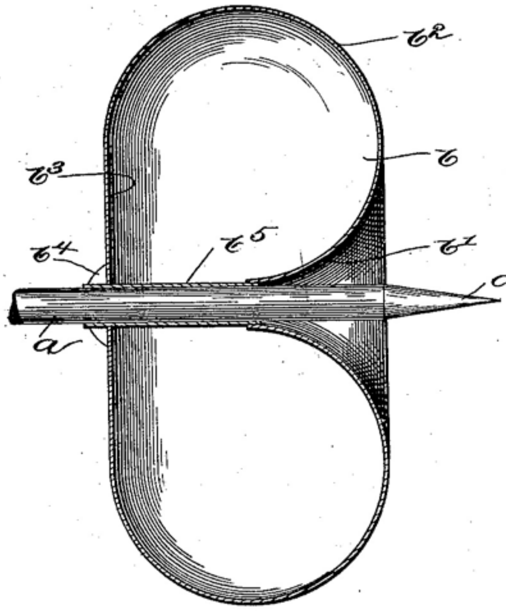


Fig. 2.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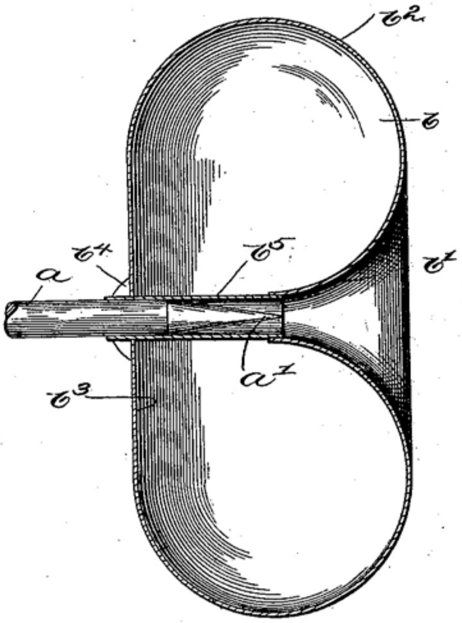
b^3
b^4
b^5
b^1
a^1
a

Fig. 3.


b^2
b
a
b^4
b^5
b^1
a^1
b^3

Witnesses.
W. C. Lunsford
A. B. Kaiser

Inventor.
Thomas B. Kinraide
by Crosby Gregory.
attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

ELECTRODE.

SPECIFICATION forming part of Letters Patent No. 689,199, dated December 17, 1901.

Application filed May 2, 1901. Serial No. 58,511. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, a citizen of the United States, residing at Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Electrodes, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention is an electrode having for its object the regulation of the discharge effects or capabilities of the electrode.

As is well known, in certain situations of electrical discharge—as, for instance, in connection with the discharge-electrode of a Leyden jar—there is a tendency to continuous leakage, which prevents the full charging of the jar, and, again, it is sometimes desirable to check the brush-discharge—as, for instance, in an induction apparatus—especially when the two discharge-terminals are separated some distance, and also it is frequently convenient to be able to reverse the direction of discharge between two electrodes. Accordingly I have devised the hereinafter-described electrode for accomplishing, among other things, the above results, and in effecting my purpose I have availed myself of the principles set forth in my application, Serial No. 26,709, filed August 13, 1900, by combining the extensionless-point feature with the limitless-plane feature, as defined in my said application.

In the preferred construction of my present electrode I mount the point-discharge or discharge-rod adjustably in the center of the limitless plane, shaping the latter to correspond, so that it will maintain itself, electrically speaking, as a receiving plane or surface without edges or angular or pointed surfaces.

Further description of my invention and the operation thereof will be set forth in the following portion of the specification by reference to the accompanying drawings.

In the drawings, Figure 1 is a perspective view of my electrode. Fig. 2 is a vertical cross-section thereof. Fig. 3 is a view similar to Fig. 2, showing the electrode in a different adjustment.

It will be understood that my electrode is applicable to any conductor, the latter being herein indicated as a rod *a*, having at its forward end a point-discharge *a'*, formed integrally therewith. Mounted on the rod *a* just back of the point *a'* is the limitless-plane portion *b* of the electrode, herein shown as having a central inwardly-sloping curved surface *b'*, forming a bell-shaped mouth or opening, in the center of which is the point *a'*. The limitless-plane portion of the electrode extends from this central bell-shaped portion outwardly in such manner as to have no angular or pointed surfaces, being herein shown as curved around at b^2, substantially as shown in my before-mentioned application, the rear portion of the shell or surface extending at b^3 back to the rod *a* and being joined at b^4 to a tubular or sliding portion b^5 thereof. The purpose of this construction is to permit the point and surface to be moved relatively to each other so that the point may occupy an extended position, as shown in Fig. 2, or an intermediate position, as shown in Fig. 1, or a retracted position, as shown in Fig. 3, the portion *b* being in my present construction simply shoved backward or forward on the rod *a*. When the point projects forward, as indicated in Fig. 2, the electrode operates freely as a point-discharge; but when the parts are in the position shown in Fig. 3 the point is rendered inactive by reason of its inability to discharge past the extended surface *b*, which is charged with the same electricity as the point, this extended area of charged surface of like electricity repelling the discharge tendency of the point. Also by moving the two parts in one direction or the other a minimum or maximum charge or tendency to discharge may be maintained. For instance, as shown in Fig. 2, there is the greatest freedom of discharge, and this decreases as the shielding or screening influence of the limitless plane portion *b* is moved forward toward the point.

If, for example, my electrode is employed as a discharge-terminal of a Leyden jar and it is desired to check the brush discharge that takes place in the Leyden jar, causing the same slowly to "leak," as it is termed, all that is necessary is to move the surface *b* into screening position relatively to the point, thereby insuring a maximum charge of the jar. When thus charged, my electrode makes it possible to discharge the charge across a much greater air-gap by means of the screened point than is possible with simply usual discharge-terminals.

I have not undertaken to set forth in this specification all the uses to which my invention may be put, as it will be understood that it is applicable to a practically endless range of uses in connection with electrical apparatus.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An electrode having a discharge-point, and means for electrically screening said point for limiting the tendency thereof to discharge.

2. An electrode having a discharge-point, and adjustable means for electrically screening said point for varying the tendency thereof to discharge.

3. An electrode having a comparatively fine point combined with a plane conducting-surface having its edges curved or rolled rearwardly and inwardly, and means for moving said surface relatively to said point.

4. An electrode having a plane conducting-surface shaped without edges or angular or pointed surfaces, combined with a point-discharge mounted within the area of said surface and projecting therefrom.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
WILHELMINA C. HENSER.

No. 724,186. PATENTED MAR. 31, 1903.

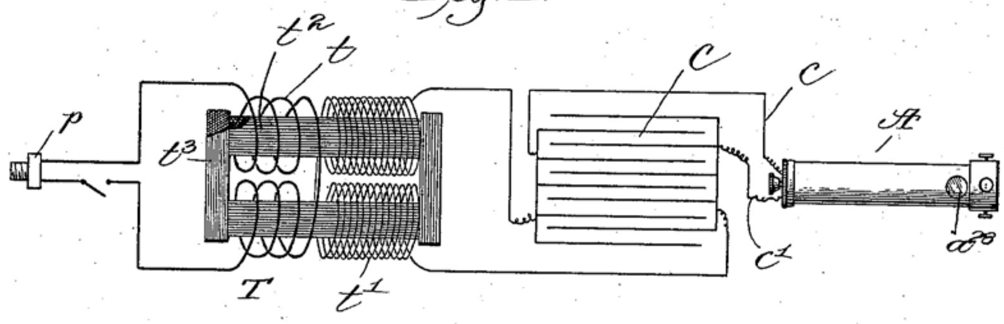
H. JACKSON.

ELECTRICAL APPARATUS FOR THERAPEUTICAL WORK.

APPLICATION FILED JAN. 22, 1903.

NO MODEL.

Fig. 1.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p
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C^1
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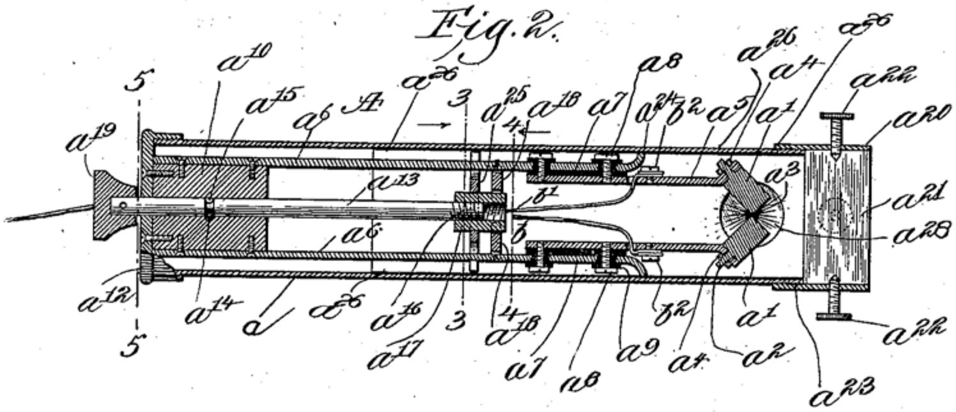
T
t^1

Fig. 2.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a^{21}
a^{28}
b
a^6
a^{12}
a^{14}
a
a^{26}
a^{16}
3
4
a^{18}
b^2
a^1
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5
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a^7
a^8
a^9
a^4
a^2
a^{23}

Fig. 3.

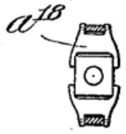


Fig. 4.

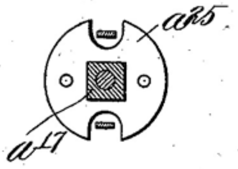
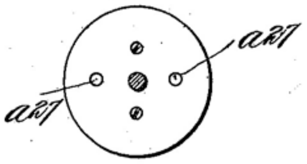


Fig. 5.



Witnesses.
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Inventor.
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Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HOWARD JACKSON, OF NEWTON, MASSACHUSETTS.

ELECTRICAL APPARATUS FOR THERAPEUTICAL WORK.

SPECIFICATION forming part of Letters Patent No. 724,186, dated March 31, 1903.

Application filed January 22, 1903. Serial No. 140,161. (No model.)

To all whom it may concern:

Be it known that I, HOWARD JACKSON, a citizen of the United States, residing at Newton, county of Middlesex, and State of Massachusetts, have invented an Improvement in Electrical Apparatus for Therapeutical Work, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is an apparatus for producing ultraviolet rays for Finsen treatments, and by the latter term I intend to include the various forms of treatment suggested by medical men in the general line of Dr. Finsen's experiments, whereby various bacteriological growths are destroyed or their growth retarded by exposure to strong ultraviolet rays.

The object of my experiments and investigation has been to render this great discovery practically available to the medical profession generally by producing an apparatus capable of generating a superior light at minimum cost, thereby bringing the apparatus itself within the reach of all and making it possible to reduce the time required for successful treatment to such a short period as to adapt it to the frailest subject.

The constructional details and further advantages of my invention will be pointed out in the course of the following description, reference being had to the accompanying drawings, in which I have shown a preferred embodiment of my invention.

In the drawings, Figure 1 is a diagrammatic view of the apparatus complete. Fig. 2 is a central longitudinal section of the light-tube. Figs. 3 and 4 are cross-sectional views of the latter, taken, respectively, on lines 3 3 4 4, Fig. 2. Fig. 5 is an end view of said tube, taken on line 5, Fig. 2.

Referring more particularly to the light-producing tube A, which constitutes one of the important features of my invention, it will be seen that it comprises a tube a, which may be of any desired material suitable for the purpose and capable of withstanding the usage to which it is put, and mounted suitably in a tube are the electrodes and operating mechanism therefor.

The electrodes which I prefer to use are composed of iron, as indicated at a', said electrodes being short and provided at their supported ends with threaded studs a^2 and made square at their free ends a^3, being held in position by any suitable means, as by nuts a^4, which serve to clamp them against supports a^5, carried on an adjusting-frame, herein shown as consisting of opposite rods a^6, insulated from said supports at a^7 and connected thereto by screws a^8, mounted in insulating-bushings a^9. The frame a^6 has a block a^{10} at one end, preferably secured to a cap a^{12}, provided for closing the tube at one end, and in said block is mounted a rod a^{13} free to rotate, but held against longitudinal movement by a pin a^{14}, occupying a groove a^{15} in said rod. At its inner end the rod a^{13} is in threaded engagement at a^{16} with a nut a^{17}, connected by toggle-links a^{18} to the frame, so that upon rotating the rod a^{13} by its thumb-nut a^{19}, which projects through the cap a^{12}, the electrodes a' may be adjusted as required. Adjacent the end carrying the electrodes I provide a screen-holder a^{20}, adapted to receive a block of ice, rock-salt, or other suitable substance a^{21}, which may be held therein in any suitable way, as by means of set-screws a^{22}, and is removably mounted by threads or otherwise on the tube, as indicated at a^{23}. The frame a^6 preferably has its free end turned out, as indicated at a^{24}, to center the same and also preferably carries a spider or centering means a^{25} intermediate its length, and the tube a has an insulating-lining a^{26}, of asbestos or other material, adapted to withstand the heat and insulate the outside case or tube. Feed-wires b b' are secured at b^2 to the supports a^5 and pass out through the cap a^{12}, as indicated at a^{27}. Suitable sight-windows a^{28} are provided for watching the electrodes.

One main purpose of my invention is to obtain a light of maximum efficiency, whereby the time required for an exposure is reduced to a minimum, so as to avoid the necessity of a tedious and dangerous exposure or treatment.

I have found that by my apparatus the exposure can be reduced to an exceedingly-short period, five minutes being sufficient in some instances.

The iron electrodes are very rich in actinic rays, and by having their ends square I get an exceedingly sharp effect, and a further very important feature of my invention resides in providing, in connection with a condenser C, a step-up transformer T, which may receive its current from any usual alternating commercial circuit of one hundred to one hundred and ten volts, to which it may be connected by a usual electric-light plug *p*.

For general use the transformer may be wound with eight layers of three hundred and four turns of No. 16 magnet-wire for the coarse winding *t* and twenty layers of sixteen hundred turns of No. 24 wire for the fine winding t' on cores t^2, six by one and five-eighths inches, composed of fine iron wire connected at their ends by laminated iron yokes t^3 one and one-fourth by one and three-fourths by four and one-half inches, and as thus constructed the condenser of micanite sheets and tin-foil has a capacity of about one-fourth of a microfarad connected by heavy flexible conducting-wires $c\ c'$ to the lamp A for carrying the rapidly-oscillating current.

This apparatus is not only relatively inexpensive, but can be used with any commercial alternating current, as stated. The apparatus is very readily portable and does not require a skilled operator, is rapid in its work—a treatment requiring only two to five minutes is capable of treating a large area satisfactorily—and is inexpensive to operate. It will run steadily without heating and does not require adjustment, except at long intervals, and the light is exceedingly rich in ultraviolet rays.

In the foregoing description I have stated the size and proportions which I have found the best for a convenient portable apparatus; but it will be understood that by increasing the condenser a larger arc may be produced, the transformer being modified within limits by using larger wire for carrying increased current; and it will be understood that I have set forth herein the said preferred proportions as an example to enable those skilled in the art to apprehend more clearly my invention.

For practical use it is necessary that the ultraviolet rays shall preponderate, and one object of my invention is to produce these rays in abundance without at the same time generating to an appreciable extent the other rays of the spectrum, or, in other words, I do not produce an intense light and then eliminate therefrom the superfluous and undesirable rays, (which is an expensive and cumbersome process;) but I have devised an apparatus which arrives at the desired result directly by producing the ultraviolet rays in great abundance by having a condenser operated by an alternating-current step-up transformer in time to deliver a high-tension high-frequency current directly to the arc-lamp. It is well known that a current of this character will produce an arc rich in ultraviolet rays. By my apparatus these rays are produced in an inexpensive, simple, and easily-operated mechanism capable of long continuous use.

I have aimed to produce an apparatus safely operable by a person not specially skilled and at a low cost, portable, and capable of operation with current commonly available.

My apparatus requires practically no attention, excepting turning the switch and occasionally adjusting the electrodes.

While I prefer to use iron electrodes, I do not wish to limit myself thereto, except where specified in the claims. These electrodes are mounted at an angle of about ninety degrees, as shown, and are held rigidly at one end, being capable of being turned to bring new portions of the sharp corners into action at the arc, these electrodes being inexpensive, long-lived, readily mounted, highly actinic, not liable to injury, interchangeable, and economical.

When it is desired to renew the screen a^{21}, the holder can be quickly removed from the tube and another put in place, or the screen material may be released by loosening the thumb-screws and a fresh supply substituted.

When it is desired to remove the electrodes or get at them, this may be done quickly simply by unscrewing the cap a^{12} and slipping the whole connected apparatus out of the tube.

Without undertaking to set forth all the modifications in form and arrangement of my apparatus and the various further advantages thereof, what I claim as new, and desire to secure by Letters Patent, is—

1. An apparatus of the kind described, comprising in series a source of alternating current, a step-up transformer and a condenser for producing a high-tension, high-frequency current, and an arc-lamp operated thereby for producing ultraviolet rays, substantially as described.

2. An apparatus of the kind described, comprising in series a source of alternating current, a step-up transformer and a condenser for producing a high-tension, high-frequency current, and an arc-lamp operated thereby for producing ultraviolet rays, said lamp being provided with iron electrodes, substantially as described.

3. An apparatus of the kind described, comprising in series a step-up transformer, a condenser, and an arc-lamp for producing ultraviolet rays, said lamp having square-ended iron electrodes arranged at an angle to each other for producing an arc between them, substantially as described.

4. In an apparatus of the kind described, a lamp comprising a case, a frame therein, electrode-supports carried thereby, and iron electrodes fixed rigidly on said supports, and means for adjusting said supports toward and from each other, substantially as described.

5. In an apparatus of the kind described, a lamp comprising a case, a frame therein, sup-

ports carried thereby, square-ended electrodes mounted in said supports, said electrodes being capable of being rotated in said supports, but immovable longitudinally therein, substantially as described.

6. In an apparatus of the kind described, a lamp, comprising a case, opposite electrodes, separate supports therefor, and means for adjusting said supports toward and from each other, comprising toggle-links and an operating member therefor connected with said links and extending outside of the case, substantially as described.

7. In an apparatus of the kind described, a lamp comprising a case, opposite electrodes, separate supports therefor, and means for adjusting said supports toward and from each other, comprising toggle-links, a nut connecting the same, and a threaded rod in engagement with said nut, said rod extending beyond the case, substantially as described.

8. In an apparatus of the kind described, a lamp comprising a case, opposite electrodes, separate supports therefor, and means for adjusting said supports toward and from each other, comprising a threaded rod for operating said links, said rod extending beyond the case, substantially as described.

9. In an apparatus of the kind described, a lamp comprising a case, a removable cap therefor, a frame rigidly connected to said cap, supports carried by said frame, electrodes mounted on said supports, whereby the frame and all parts connected therewith can be bodily removed with said cap, substantially as described.

10. In an apparatus of the kind described, a lamp, comprising a case having at one end a cap and at the other end a removable screen-holder provided with means for detachably holding a screen of ice, a frame, supports and electrodes, all carried by said cap, and means for maintaining the same out of contact with the case, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HOWARD JACKSON.

Witnesses:
Geo. H. Maxwell,
Wilhelmina C. Heuser.

No. 770,431. PATENTED SEPT. 20, 1904.

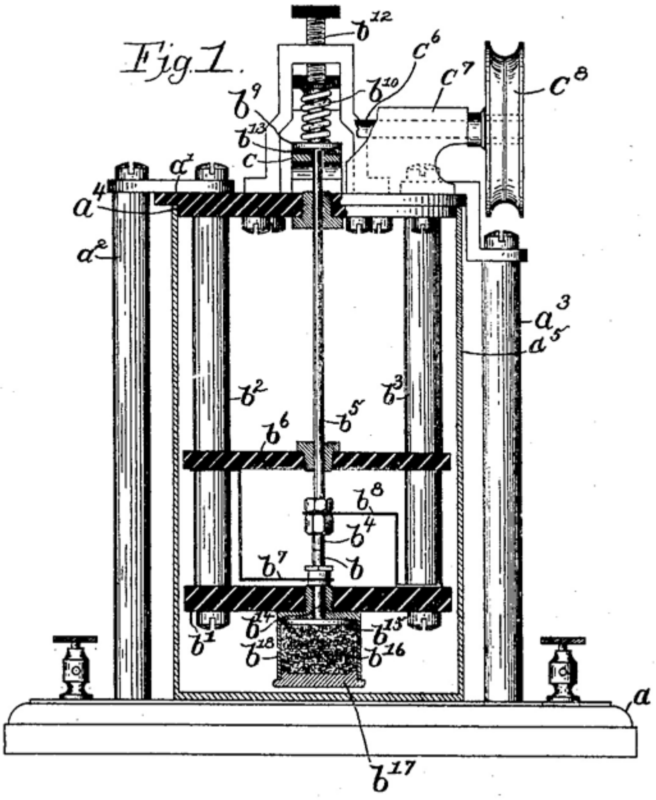
T. B. KINRAIDE.

INTERRUPTER.

APPLICATION FILED APR. 6, 1904.

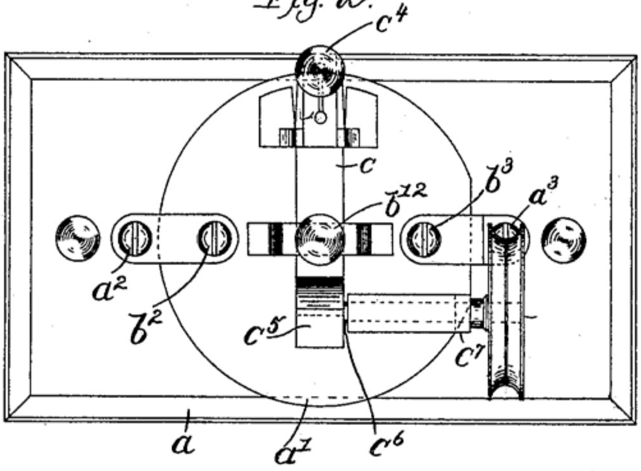
NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



b^{12}
c^{6}
c^{7}
c^{8}
b^{9}
b^{10}
b^{13}
c
a^{1}
a^{4}
a^{2}
a^{3}
a^{5}
b^{2}
b^{5}
b^{3}
b^{6}
b^{8}
b^{4}
b^{7}
b
b^{14}
b^{15}
b^{1}
b^{18}
b^{16}
a
b^{17}

Fig. 2.



c^{4}
c
b^{12}
b^{3}
a^{3}
a^{2}
b^{2}
c^{5}
c^{7}
a
a^{1}
c^{6}

Witnesses.
Howard G. Davis.
M. I. Dilhommeau.

Inventor.
Thomas B. Kinraide,
by Geo. H. Maxwell
Atty.

No. 770,431. PATENTED SEPT. 20, 1904.

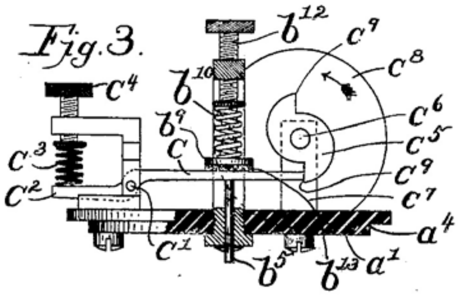
T. B. KINRAIDE.

INTERRUPTER.

APPLICATION FILED APR. 6, 1904.

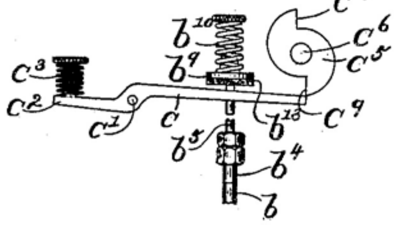
NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.



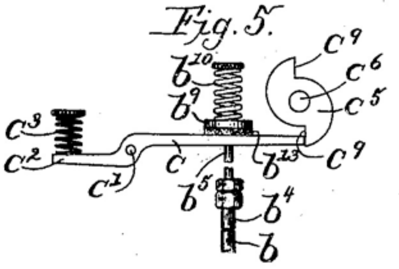
b^{12}
c^{9}
c^{8}
b^{10}
c^{4}
c^{6}
b^{9}
c^{5}
c
c^{3}
c^{9}
c^{2}
c^{7}
a^{4}
c^{1}
b^{5}
b^{13}
a^{1}

Fig. 4.



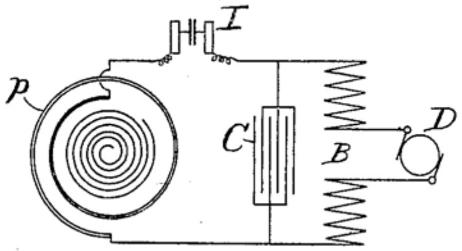
c^{9}
b^{10}
c^{6}
c^{5}
c^{3}
b^{9}
c^{2}
c
b^{13}
c^{9}
c^{1}
b^{5}
b^{4}
b

Fig. 5.



c^{9}
b^{10}
c^{6}
c^{5}
b^{9}
c^{3}
c^{2}
c
b^{13}
c^{9}
c^{1}
b^{5}
b^{4}
b

Fig. 6.



Witnesses.

Howard G. Davis.

M. I. Delhommeau.

Inventor.

Thomas B. Kinraide,

by Geo. H. Maxwell Atty.

No. 770,431. Patented September 20, 1904.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF JAMAICA PLAIN, MASSACHUSETTS.

INTERRUPTER.

SPECIFICATION forming part of Letters Patent No. 770,431, dated September 20, 1904.

Application filed April 6, 1904. Serial No. 201,941. (No model.)

To all whom it may concern:

Be it known that I, Thomas B. Kinraide, a citizen of the United States, and a resident of Jamaica Plain, in the Commonwealth of Massachusetts, have invented an Improvement in Interrupters, of which the following description, in connection with the accompanying drawings, is a specification.

My invention is an improvement in interrupters, and has for its object the provision of means for obtaining a quick short break, the means for obtaining the same, as herein shown, being mechanical. In other words, the object of my invention is to cause a break for the least possible time and to keep the circuit closed the longest possible time, and to accomplish this result it is necessary as far as possible to do away with momentum, having no hammer as such, but providing a striking device operating against the tension of a spring suddenly released.

In my Patent No. 623,318, dated April 18, 1899, I have shown and described a "spark-gap" composed of plates one of whose functions is to receive a condenser discharge when properly adjusted, and one of the objects of the present invention is to obtain certain of the advantages of the aforesaid construction by means of an interrupter, and I obtain the same by having the separation of the electrodes so brief and sudden that the movable electrode returns just in time to take the condenser discharge and prevent the surging back of the impulse or wave from the condenser which would otherwise take place through the inductance-coil, but which by having the break short and quick (and the parts free of momentum) permits the gap to close in time to direct the condenser discharge through the primary of the induction-coil, and the break or gap can be so adjusted as to consume or receive all the condenser discharge as fast as conveyed to it, thereby preventing all surging back, and hence securing the greatest efficiency at the primary.

Various other advantages and further constructional details of my invention will be pointed out and the operation thereof will be fully set forth in the course of the following description, reference being had to the accompanying drawings, in which I have illustrated a preferred embodiment of my invention.

In the drawings, Figure 1 is a central vertical section of one form of my interrupter. Fig. 2 is a top plan thereof. Fig. 3 is a fragmentary view in vertical cross-section, taken at right angles to Fig. 1. Figs. 4 and 5 are fragmentary details similar to Fig. 3, showing, respectively, the interrupter in position about to give a break and in position just causing a break. Fig. 6 is a diagrammatic view showing the circuit connections for which my interrupter is particularly adapted.

The main principle of my interrupter is that the break is caused by a striker propelled by a suddenly-released spring or by equivalent means, which causes the same to give a hammer-like blow, without, however, employing a hammer. The old interrupter employs a swinging hammer or momentum device and is practically limited in its operation to the momentum due to its weight, and this very weight also renders its action necessarily sluggish, which is further increased by the action of the electromagnet, which tends to hold the hammer until deënergized. Having premised this much, my invention will be readily understood from the following brief description.

Mounted on a suitable base a is a top plate or support, herein shown as a cap a', retained by posts a^2 a^3 and shouldered at a^4 to engage the upper end of an oil well or cup a^5, in which the separating contacts or electrodes are mounted.

As herein shown, the fixed electrode b is mounted in a cross-bar b', carried by two opposite rods or conductors b^2 b^3, and the movable electrode b^4 is carried by a rod b^5, slidingly mounted in a cross-bar b^6 and in the top plate a', conductor-wires or copper ribbons b^7 b^8 being connected, respectively, with the electrodes b b^4 and to the rods b^2 b^3. The rod b^5 has a shoulder or head b^9 at its upper end and is normally held in contact with electrode b by a spring b^{10}, whose tension is regulated by a thumb-screw b^{12}. Beneath the head b^9 is a striker c, shown as a light plate-metal arm pivoted, as at c', and having its rear end c^2 engaged by a spring c^3, whose tension is regulated by a thumb-screw c^4. The striker c is freely movable toward and from the head b^9, a piece of felt or other cushioning material b^{13} being interposed for lessening the noise, and the end of the said striker projects forward into the path of an actuator, herein shown as a shouldered cam c^5, mounted on the end of a shaft c^6, journaled in a block c^7 and carrying at its opposite end a drive wheel or pulley c^8.

As the cam rotates in the direction of the arrow, Fig. 3, the parts first assume the position shown in Fig. 4, spring c^3 being strongly compressed and striker c moved back away from the head b^9 of the movable electrode or electrode-carrier, and thereupon further rotation of the cam permits the striker to escape from the shoulder c^9 thereof, and instantly spring c^3 causes said striker to deliver a sudden and severe blow against the head b^9, which instantly separates the electrodes; but as the force of the blow is spent the very moment it strikes the head b^9, there being no heavy swinging hammer or momentum device, the blow is given entirely by the suddenly-released spring, or, in other words, the mechanical actuator or cam that operates the striker does not deliver the blow, but the latter is brought about entirely separately from the cam by the suddenly-released spring. This will act to open a strongly spring closed pair of contacts, which could not be opened even by a heavy hammer, and yet it will do so with a quickness and to such a slight extent that the closing is almost instantaneous, and thereby accomplishes the short break and quick closing which is the principal object of the invention.

The chatter or noise of the contacts or electrodes b b^4 upon each other, due to the strong action of the spring b^{10}, is objectionable, and I have found that it can be almost entirely prevented by providing the supporting-rod b^{14} of the electrode b^7 with a head b^{15}, resting against a cushion, shown as consisting of a series of felt disks b^{16}, retained by a removable cap b^{17} in a casing b^{18}, supported on the under side of the plate b', so that as the blow of the movable electrode is delivered the noise is effectually prevented.

The operation of my invention will further be understood by reference to Fig. 6, where it will be seen that the interrupter I is contained in the circuit of a primary p of an induction-coil, the other end of the primary leading to an inductance-coil B and thence to a source of energy D, a condenser C being inserted across the circuit between the inductance-coils and the interrupter. With an old interrupter operating in the above system the action would necessarily be so sluggish as to obtain little efficiency, the discharge from the condenser surging back through the inductance-coils during the break or period of opening of the electrodes; but by reason of the extremely short and quick break made possible by my interrupter the discharge from the condenser is received by the movable electrode just as it is moving back into closed position, and this operation is repeated, so as to consume all the condenser discharge as fast as it is delivered.

In the preferred form of my apparatus, which I have described above, the cam c^5 releases the striker twice at each rotation, the force of the blow being determined by the adjustment of the striker-spring c^3, and the striker spends its force against the shoulder or head b^9, delivering the blow, however, against the felt buffer b^{13}, and instantly the spring b^{10} restores the contacts to closed position. In other words, the desired intense quickness of movement is due to the inertia of the contact and its spring and to the fact that when the thin light striker has delivered its quick-flying blow it instantly parts with its force, there being nothing to continue its impelling movement, as would be the case if it were weighted like a hammer, and therefore the result is that the instant the force of the striker is spent against the contact-head the high-tension spring of the latter closes the contacts again. The periodicity of movement thereof may be regulated by adjusting the tension of the spring so as to insure that the open interval corresponds to the time of the forward wave or impulse of the condenser.

As the electrode returns to closed position and strikes against the relatively fixed contact the noise is taken up or absorbed by the sound-deadening felt disks b^{16}, which are retained in the oil-tight casing b^{18}.

It will be understood that I have shown merely one of the many embodiments of which my invention is capable, the present embodiment being well adapted to continuous and hard usage; but I do not intend to limit myself to the constructional details herein set forth, excepting as otherwise required in the claims.

Having described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An interrupter, comprising separable contacts, means tending to maintain them closed, a striker for momentarily separating them, impelling means for imparting the striking movement to said striker, and an independent actuator therefor.

2. An interrupter, comprising separable contacts, a striker for suddenly moving one of said contacts, and a mechanical actuator for operating said striker.

3. An interrupter, comprising separable contacts, yielding means for maintaining them closed, and spring-impelled means for momentarily separating said contacts.

4. An interrupter, comprising separable contacts, yielding means for maintaining them closed, a striker having its striking end thin and light for reducing momentum effects to a minimum, a spring adapted to be compressed

and released for causing said striker to separate said contacts by the force of its impact, and means for releasing said spring.

5. An interrupter, comprising separable contacts, a striker having a thin, light, striking end, means consisting of a released spring for imparting a sudden striking impulse to said striker for separating said contacts, and means for instantly counteracting the separating effect of said striker and closing the contacts.

6. An interrupter, comprising separable contacts, a striker, means consisting of a released spring for actuating said striker to separate said contacts, and an oppositely-acting spring for instantly closing the contacts thus separated.

7. An interrupter, comprising separable contacts, a striker for separating them, and a cam-actuator for operating said striker.

8. An interrupter, comprising separable contacts, carrying means for one of said contacts provided with a shoulder or head, a cushion on the inner side of said head and a spring-impelled striker for acting against said cushion to separate said contacts.

9. An interrupter, comprising separable contacts, carrying means for one of said contacts provided with a shoulder or head, a cushion on the inner side of said head and a spring-impelled striker for acting against said cushion to separate said contacts, and a cushion bearing against the outer end of the other of said contacts.

10. An interrupter, comprising separable contacts, a striker for moving one of them, a cushion-holder provided with sound-deadening yielding material, and means carried by the other of said contacts for bearing against said materials and thereby deadening the sound of the closing of said contacts.

11. An interrupter, comprising separable contacts, quick separating means therefor, quick closing means, and sound-deadening means for receiving the closing impact of said contacts.

12. An interrupter, comprising separable contacts, quick separating means therefor, quick closing means, and sound-deadening means for receiving the closing impact of said contacts, consisting of a series of felt layers for receiving the closing impact of said contacts.

13. An interrupter, comprising separable contacts, quick separating means therefor, quick closing means, and sound-deadening means for receiving the closing impact of said contacts, an oil-well inclosing said contacts, and an oil-tight casing inclosing said sound-deadening means.

14. The combination with an induction-coil and condenser of an interrupter, comprising separable contacts, separating means and closing means therefor for giving a long closed period and an exceedingly short open period, and adjusting means coöperating therewith to give said contacts a periodicity of movement to receive and transmit the full condenser discharges.

In witness thereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
R. S. FORD,
JOHN E. PORTER.

No. 770,432. PATENTED SEPT. 20, 1904.

T. B. KINRAIDE.

HIGH POTENTIAL INDUCTION COIL.

APPLICATION FILED MAY 25, 1904.

NO MODEL.

Fig. 1.

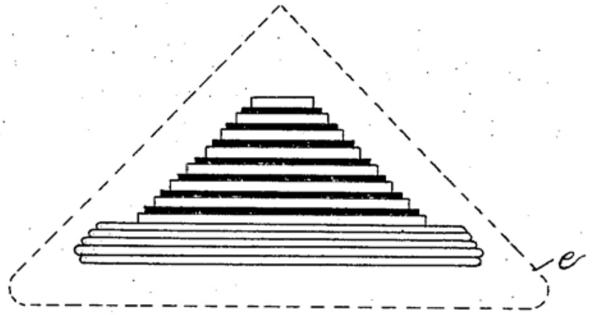


Fig 2.

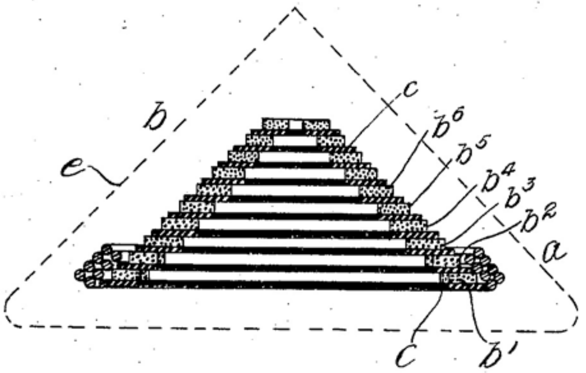
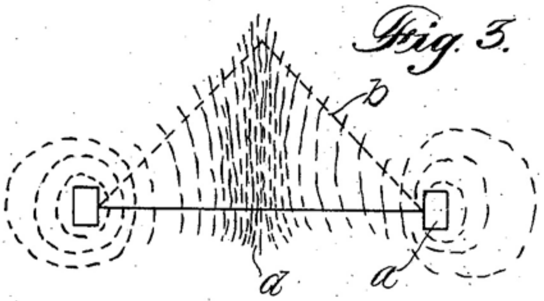


Fig. 3.



Witnesses:–
John E. Porter
Alexander Lincoln

Inventor:–
Thomas B. Kinraide.
by Geo. H. Maxwell
Attorney.

No. 770,432. Patented September 20, 1904.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

HIGH-POTENTIAL INDUCTION-COIL.

SPECIFICATION forming part of Letters Patent No. 770,432, dated September 20, 1904.

Application filed May 25, 1904. Serial No. 209,684. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, a citizen of the United States, residing in Boston, in the county of Suffolk, State of Massachusetts, have invented an Improvement in High-Potential Induction-Coils, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention is an improvement in that kind of apparatus which I have patented heretofore and whose advantages and purposes are set forth in my Patent No. 615,653, dated December 6, 1898, the present invention having for its object the provision of means for greatly increasing the efficiency and capacity of the coil.

One of the main objects of my special kind of coil as outlined in the aforesaid patent is to obtain a unidirectional discharge or high voltage at the center, and for this purpose the turns are made successively shorter as they recede from the surrounding primary, or, in other words, the coil is helical for providing the constantly-decreasing resistance per turn, and in my present invention I avail myself of the same principle of construction, having, however, provided means for rendering it feasible to employ coarse wire of many turns, whereby the coil has low resistance, and hence higher frequency and higher voltage. I accomplish this object by winding the coil in the form of a cone, so that the windings overlap each other and gradually approach the center. When the windings are in a flat coil, it is obvious that the extent of wire is limited to that number of turns whose aggregate diameters of wire equal the diameter of the coil, because each turn must necessarily be within the adjacent turn, whereas by building the coil in the form of a cone it is possible to have the successive layers or turns overlap the preceding layers or turns and yet be successively shorter sufficiently to insure a unidirectional flow of the current or a tendency of the current to flow in one direction, due to the constantly-decreasing resistance of the successive portions of the coil.

My invention will be further explained as to its construction, operation, and advantages in connection with the accompanying drawings, in which I have shown one embodiment of my invention, and the latter will be more particularly defined in the appended claims.

In the drawings, Figure 1 is a view in side elevation of the preferred embodiment of my invention. Fig. 2 is a vertical cross-sectional view thereof. Fig. 3 illustrates diagrammatically certain advantages thereof.

It will be understood that in the drawings I have not undertaken to show the complete mechanical embodiment or to illustrate the construction of the coil itself.

A coarse primary *a* of one or more turns is provided at the base of the coil, and from said base the secondary *b* is wound, being preferably wound in successive ring-like layers, the largest being indicated at b' at the base of the coil and thence extending diagonally upward, as indicated at b^2 b^3 b^4 b^5 b^6, &c., these successive layers being supported by insulator-rings *c*. This construction permits each successive turn or layer of secondary wire to overlap the preceding layer, and yet each successive layer is shorter, and therefore has less resistance, than the preceding layer. For example, b^2 overlaps b' and is overlapped by the layer b^3, so that although each layer may thereby have the same number of turns yet these turns can be composed of coarser wire than would be the case if all the layers were in the same flat plane with the layer b'. Also this construction brings the entire mass of secondary within the saturated field *d* of force, as indicated diagrammatically in Fig. 3. The decreasing resistance of the turns maintains the highest potential at the center, and the overlapping of the turns, and hence employment of coarse wire, still further decreases the resistance of the successive turns, so that the frequency and voltage are extremely high. The resistance of any secondary when operated from a condenser determines the frequency of the coil, and by my invention, which permits the employment of coarse wire, the resistance is reduced to a minimum. The angle or pitch of the cone will vary according to the conditions and purposes of use, and ordinarily the coil will be inclosed in a suitable jacket and incased in wax, as indicated by the dotted line *e*.

My invention is capable of a wide variety of embodiments and an extended field of usefulness, being specially adapted for use wherever exceedingly high frequency is desired without liability of breaking down under severe usage.

While the employment of a long coarse-wire secondary wound as explained is of great value and an important feature of my invention, I do not restrict myself thereto, as the conical arrangement is of advantage for many purposes with fine wire, nor do I limit the invention except as otherwise required in the claims to the particular shape shown.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An induction-coil whose secondary is composed of a plurality of overlapping sections successively shorter as they recede from the primary.

2. An induction-coil having its secondary composed of a plurality of successively shorter sections of greater aggregate width than the diameter of the coil, thereby decreasing the resistance, for affording very high potential.

3. An induction-coil having a conical secondary.

4. An induction-coil comprising a primary and secondary, the latter having its successive sections, toward the center, of decreasing resistance, and having a plurality of the longer sections directly adjacent the primary.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
R. S. FORD.

No. 770,433.　　PATENTED SEPT. 20, 1904.

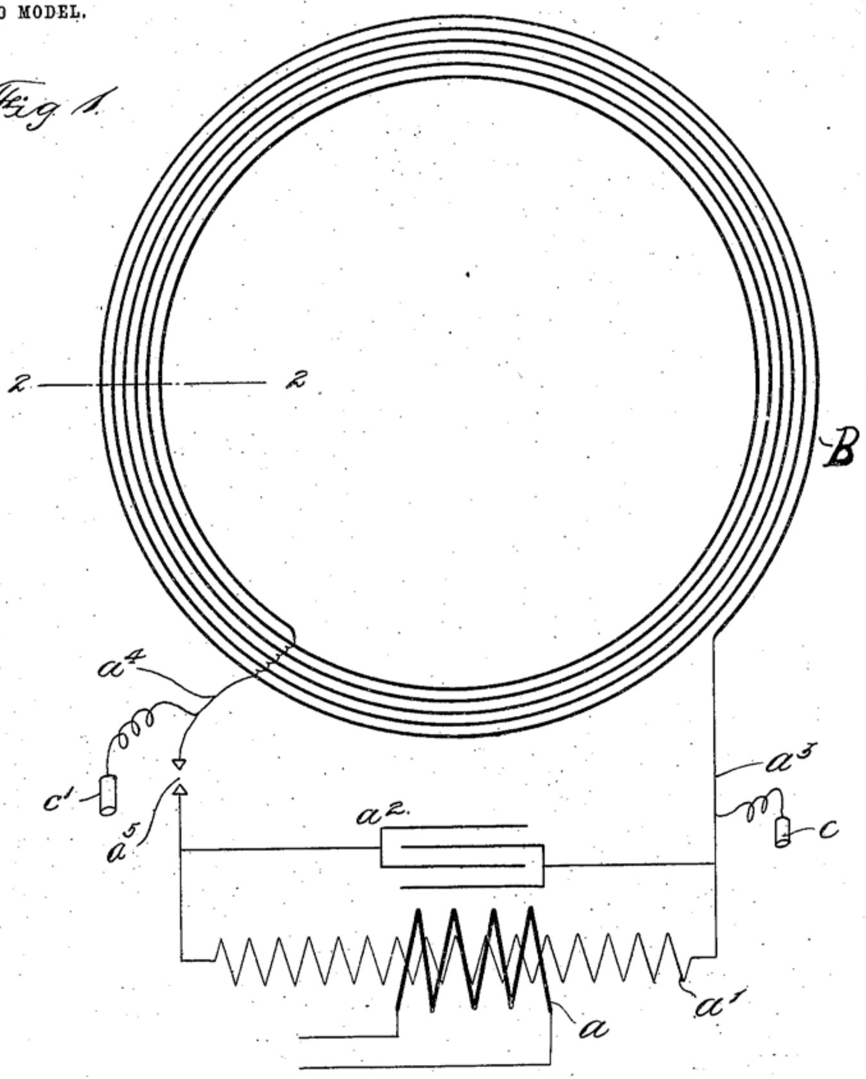
T. B. KINRAIDE.

THERMAL INDUCTOR.

APPLICATION FILED MAY 25, 1904.

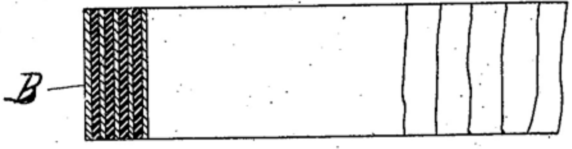
NO MODEL.

Fig. 1.



2
2
B
a^4
c^1
a^5
a^2
a^3
c
a
a^1

Fig. 2.



Witnesses:-
John E. Porter
A. M. Rice

Inventor,
Thomas B. Kinraide,
by Geo H Maxwell
Attorney.

No. 770,433. Patented September 20, 1904.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

THERMAL INDUCTOR.

SPECIFICATION forming part of Letters Patent No. 770,433, dated September 20, 1904.

Application filed May 25, 1904. Serial No. 209,687. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, a citizen of the United States, and a resident of Boston, in the Commonwealth of Massachusetts, have invented an Improvement in Thermal Inductors, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention is an electrical apparatus for therapeutical uses, the object thereof being to produce a high state of cell activity unaccompanied by the well-recognized, disagreeable, and unpleasant electrical phenomena usually attending the use of electrical apparatus.

I have discovered that it is possible to produce a peculiar heat effect, which is very advantageous in therapeutical treatment wherever sluggish conditions exist without producing any sensation of current passing through the body, but producing merely the sensation of heat. I accomplish this result by providing an electric filed of enormous frequency having very low self-inductive resistance per turn.

The structural arrangement and further advantages of my invention will be pointed out in the course of the following description, reference being had to the accompanying drawings, in which I have illustrated one embodiment of my invention.

In the drawings, Figure 1 is a diagrammatic view thereof; and Fig. 2 is a vertical cross-sectional view taken on the line 2 2, Fig. 1.

In connection with a suitable high-frequency generator, herein indicated as comprising a high-potential transformer composed of a primary a and a secondary a', the latter leading to a condenser a^2 of small area, from which lead terminals a^3 a^4, a spark-gap a^5 being interposed in one or both of said terminals, being shown in a^4, I provide a special coil B, which, taken in connection with the aforesaid high-frequency generator, produces the peculiar thermal effect, with imperceptible current effect, which constitutes my discovery. This coil B, as clearly shown in Fig. 2, in which I have shown a practical working size thereof, consists of a thin wide ribbon of suitable conducting material, such as copper, formed in a coil having large diameter and few turns. For practical purposes I have found that a coil about eighteen inches in diameter composed of five turns of ribbon one inch wide used in connection with a condenser of small capacity is very efficient for accomplishing the results which I have discovered. Suitable hand-electrodes c c' are connected to the terminals of the coil as near to the condenser as convenient, as indicated in Fig. 1.

In use the terminals c c' are grasped by the hands of the patient, or if other forms of electrodes are used they are placed upon the body or manipulated in any manner desired by the physician, the result being that a gently-permeating heat effect suffuses the portions of the body adjacent the electrodes c c' without, however, being accompanied by any of the disagreeable and in some instances dangerous electrical effects which accompany the ordinary faradic current. There is no painful spark and no danger whatever from the current, so that it can be safely applied with a sponge without any danger of bad effects in removing or applying the same in a wet condition. The enormous high frequency produced by this special coil produces a bombardment in the molecular structure of the tissues, resulting in a mechanical heat effect, and yet as the resistance per turn of the coil B is extremely low in self-induction, there being scarcely any rise in potential from turn to turn, there is no appreciable electric effect present. The high state of cell activity produced by this apparatus manifests itself in various ways—as, for example, by the production of moisture on the surface and the reddening of the skin.

I do not intend to limit myself to the precise form, proportions, or arrangement herein described, as it will be readily understood by those skilled in the art that the invention is capable of a wide variety of embodiments.

Having described my invention, what I claim to be new, and desire to secure by Letters Patent, is—

1. A device of the kind described, comprising a source of high-frequency current includ-

ing a condenser of small capacity, and a coil in series therewith, consisting of few turns of large diameter and extremely low self-inductive resistance.

2. A device of the kind described, comprising a source of high-frequency current, in series with a coil of low self-inductive resistance per turn and having an inappreciable difference in potential between successive turns.

3. A device of the kind described, comprising a high-frequency generator including a condenser of small capacity, and a coil of large diameter and few turns of conductive material presenting large superficial conducting area, said coil being connected around said condenser, and a spark-gap interposed in one terminal.

4. A device of the kind described, comprising a source of high-frequency current, in series with a coil of large diameter and few turns composed of a wide, thin ribbon conductor.

5. A device of the kind described, comprising a source of high-frequency current, in series with a coil of large diameter, few turns, and low self-inductive resistance per turn, and an electrode connected to each terminal of said coil.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
R. S. FORD.

No. 774,758. PATENTED NOV. 15, 1904.

T. B. KINRAIDE.

ELECTRIC SPARK GAP.

APPLICATION FILED MAY 25, 1904.

NO MODEL.

Fig. 1.

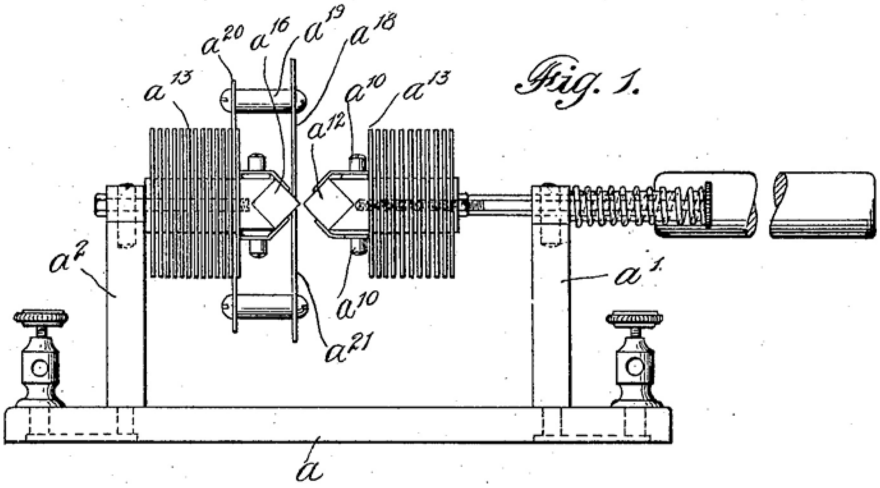


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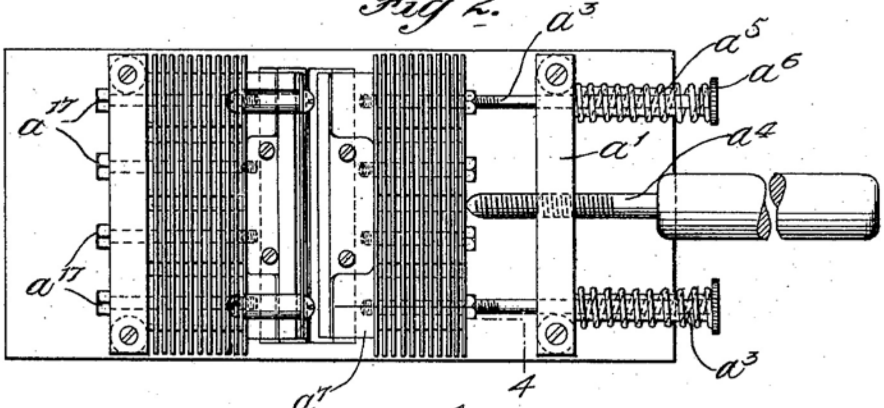
Fig 2.



a^{3}
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a^{1}
a^{4}
a^{17}
a^{7}
4
a^{3}

Fig. 3.

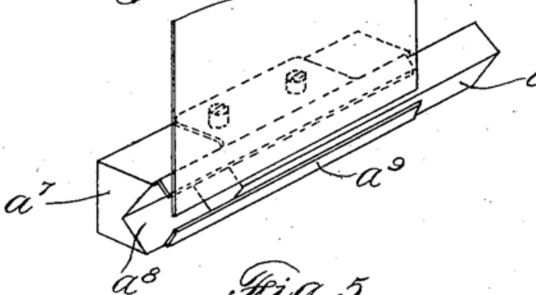


Fig. 4.

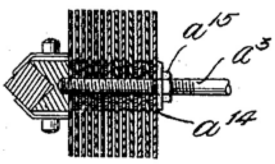
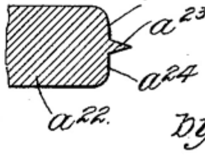


Fig. 5.



a^{24}
a^{23}
a^{24}
a^{22}

Witnesses,
John E. Porter.
Robert Ringrose.

Inventor,
Thomas B. Kinraide,
by Geo. H. Maxwell
Attorney.

No. 774,758. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

ELECTRIC SPARK-GAP.

SPECIFICATION forming part of Letters Patent No. 774,758, dated November 15, 1904.

Application filed May 25, 1904. Serial No. 209,686. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, a citizen of the United States, and a resident of Boston, in the Commonwealth of Massachusetts, have invented an Improvement in Electric Spark-Gaps, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to spark-gaps intended particularly for high-frequency apparatus where great strain and constant action with a high-voltage current is required, my object being to provide a spark-gap capable of continuous service with uniform and economical action. One of the main difficulties encountered in this class of apparatus is that the heating effects are apt to cause a short circuit, thereby destroying the sparking effects and rendering them irregular in their action by tending to produce a continuous arc, due partly to the heated condition of the metal and partly to the heated air, which forms a good conductor between the two electrodes, and also the intense heating of the electrodes, especially at their points, tends rapidly to destroy them. Moreover, when used with an alternating current a point spark-gap is apt to be quite irregular and unsteady in its operation. Also the oxidizing of the metal causes serious interference with the continuous and proper operation of the usual spark-gap. My invention is to obviate all these disadvantages, as will be more fully pointed out in the course of the following description, where I have set forth in detail a preferred mechanical embodiment of my invention, and the latter will be more particularly defined in the appended claims, forming a part of this specification.

In the drawings, Figure 1 represents one embodiment of my invention in side elevation. Fig. 2 is a top plan view thereof. Fig. 3 is a fragmentary detail in perspective, showing one of the percussion-plates in place and illustrating the removable character of the electrodes. Fig. 4 is a transverse sectional view taken on the dotted line 4, Fig. 2. Fig. 5 is a transverse sectional view of a modified form of discharge-electrode.

Mounted on a suitable base a are opposite uprights or supporting-standards a' a^2 for supporting the electrodes which constitute the apparatus the standard a' supporting slide-rods a^3 and an adjusting-screw a^4, operating in opposition to springs a^5, held between the support a' and headed ends a^6, provided on the slide-rods a^3. The rods a^3 support at their forward ends an electrode-carrier a^7, herein shown (see more particularly Fig. 3) as having a slideway a^8 at its forward side and provided with overhanging retaining-clips a^9, removably secured to the carrier a^7 by set-screws a^{10}. Said clips a^9 and way a^8 constitute a receiving-passage and holder for a removable electrode a^{12}. At the rear of the electrode-carrier a^7 I mount a series of vertically-extending heat-separators a^{13}, spaced apart by any suitable means, herein shown as themselves threaded upon the slide-rods a^3 and held apart by intervening washers a^{14} and clamped in immovable relation by nuts a^{15}. Opposite the electrode a^{12} is a similar electrode a^{16}, removably retained in a similar holder, composed of clips and a carrier, the same as already described. The latter is supported on rods a^{17}, rigidly held in the rear standard or support a^2 and carrying separator-plates a^{13}, as in the case of the opposite electrode.

The electrodes proper or discharge-bars a^{12} are herein shown as square in cross-section, and the seats of the holders are correspondingly shaped, the purpose of this construction being to permit the parts a^{12} to be changed, one edge thereof being kept in use until worn away, and then the electrode is simply pulled out from its holder, given a quarter-turn, and inserted again with another corner or edge presented for active use. These removable parts a^{12} are preferably composed of hardened steel, so that the oxid whenever formed is at once burned off, whereas with copper and the baser metals a permanent film of non-conducting oxid is formed, which rapidly results in insulating the discharge-surface of the electrodes. A **V**-shaped edge gives the best results; but the bar may be varied from the triangular shape to cylindrical shape to suit different conditions.

Adjacent one of the electrodes herein shown for convenience of illustration (and preferably so constructed for use) is a percussion-plate a^{18}, rigidly connected by bolts a^{19} to brackets or supporting-arms a^{20}, extending from the outer pair of rods a^{17}. Also, preferably, a similar percussion-plate a^{21} is mounted in vertical alinement with plate a^{18} to coöperate with the electrode a^{16}, on the under side thereof. These plates a^{18} a^{21} engage or are arranged close to the electrode a^{16}, slightly back from the point or edge thereof. If desired, similar percussion-plates may be employed on both electrodes, although for usual purposes the arrangement shown is sufficient and even one of the plates will ordinarily suffice.

The foregoing construction taken as a whole results in giving a uniform continuous action, the separators a^{13} serving to separate the heat effect from the electric effect, it being borne in mind that there is always present a heat effect which invariably accompanies the electric discharge, and the object of the separator-plates a^{13} is to separate these two effects, thereby confining the spark-gap discharge as nearly as possible to the electric effect solely and shunting the heat effect or separating it as developed from the electric effect as the discharge takes place between the points at the discharge-gap. This results in permitting a continuous disruptive discharge effect. Taken alone, however, it does not give uniformity of action with an alternating current, and to secure this result I provide the percussion-plate, as I have found that the main reason for unsteady and defective action in this particular is due to the fact that the alternations of the current interfere with each other and produce a bombardment at the spark-gap, resulting in a decidedly irregular sparking. I have also discovered that this irregularity of action can be entirely prevented simply by placing a plate slightly back from the discharge-point, the result being that it permits both alternations to spark across the gap. The plate simply destroys the arcing which is otherwise produced by the alternation of the current, and thereby enables the discharge to take place naturally and also make a much freer path for the discharge, permitting longer sparking.

I prefer to make the percussion-plates of copper, although other materials may be used. In Fig. 5 I have shown a construction in which the percussion-plate is embodied with the electrode as nearly as possible, (although the result is inferior to that secured by the construction above explained,) said figure showing an electrode a^{22}, having a discharge edge or point a^{23}, and adjacent thereto a plane surface a^{24}, serving very much the same purpose as the plates a^{18} a^{21}. The discharge-point a^{23} maintains a positive condition and the plane surface a^{24} a negative condition, the former constituting a discharge element and the latter a receptive area and coöperating with the point a^{23} to receive the bombardment or percussion and counteract the arcing, as above explained.

In use the alternating current passes from one electrode to the other across the gap with the utmost freedom under all conditions of stress, and the construction above explained in detail results in a steady and uniform discharge, removing all strain on the condenser by making a perfectly free and easy path for the discharge.

Besides the features of construction to which I have already directed special attention I wish to direct attention to the fact that the preferred embodiment of my invention herein disclosed provides an edge discharge of considerable length, thereby securing to a large extent the advantages more fully explained in my Patent No. 623,318, dated April 18, 1899.

It will be understood that while I have endeavored herein to comply with the law requiring a complete description of the best embodiment of my invention I do not intend to limit all my claims thereto and wish it understood that various features of my invention are applicable to other relations and that many changes in form, arrangement, and combination of parts may be resorted to without departing from the spirit and scope of my invention. For example, the main features of my invention are applicable to a point discharge-gap, and so likewise various features herein shown may be omitted and yet leave a construction capable of producing superior results over the ordinary spark-gap. I consider the removable feature of the electrodes as of considerable importance, the holder being slightly yielding for maintaining perfect contact and yet permitting the instant removal of the electrodes for the purpose of rotating them so as to bring a new edge into active position or for the purpose of replacing them with entirely new electrodes. Also the copper separator-plates or means of separating the heat effect from the electric effect of the discharge is of importance, as it prevents the overheating of the discharge electrodes. In other words, this part of the invention provides what might be termed a "cool" discharge instead of a hot discharge rapidly tending to produce an arc and also the "percussion-plates," as I term them, for taking the bombardment and preventing the colliding or interference of the alternating current, thereby giving a smooth uniform discharge. All these novel features conspire together to produce a continuously even and steady discharge. Besides these leading features I have in some of my claims claimed various specific constructional details.

Having described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an electric spark-gap, having opposite

discharge-electrodes, heat-separating means consisting of a series of thin members of heat-conductive material extending laterally outward and located contiguous to the discharge-gap for diverting and separating from the electric current the heat effects and providing a cool discharge between said electrodes.

2. In an electric spark-gap, having opposite discharge-electrodes, heat-separating means located contiguous to the discharge-gap for diverting and separating from the electric current the heat effects and providing a cool discharge between said electrodes, said means comprising a series of separated conductor-plates in heat-conductive circuit therewith.

3. In an electric spark-gap, having opposite discharge-electrodes, heat-separating means located contiguous to the discharge-gap for diverting and separating from the electric current the heat effects and providing a cool discharge between said electrodes, said means comprising separated parallel plates mounted rigidly in conductive contact with the apparatus.

4. An electric spark-gap, having heat-separators in the form of thin conductor-plates mounted rigidly thereon.

5. An electric spark-gap, comprising opposite electrodes having a series of thin conductor-plates held rigidly adjacent but out of contact with each other, and extending outwardly from the electrodes.

6. In an electric spark-gap, an electrode having a rigid carrier provided with yielding holding means, and a discharge-bar removably held thereby, said holding means springing firmly in circuit-closing contact flat against the sides of said bar for giving a large conducting area for transmission of current.

7. In an electric spark-gap, an electrode having a rigid carrier provided with yielding holding means, and a discharge-bar removably held thereby, said bar having its forward sides converging to form a discharge edge, and said holding means conforming in shape thereto.

8. An electric spark-gap, having adjustable electrodes provided with two opposite equidistant, continuous discharge edges extending parallel to each other longitudinally across the apparatus.

9. An electric spark-gap, having electrodes provided with discharge edges extending lengthwise, parallel to each other, one of said electrodes being slidingly mounted in a support at a plurality of points, and means for adjusting said electrode toward and from the other electrode.

10. An electric spark-gap, comprising opposite electrodes of conductive material, said material being disposed in mass adjacent the discharge-gap and having the conductive material at the rear thereof distributed in thin radially-extending plates, the whole electrode being secured rigidly together for giving intimate conductive contact to all parts thereof.

11. In an electric spark-gap, comprising opposite electrodes, a percussion-plate secured in close relation to one of said electrodes and slightly back from the point thereof.

12. In an electric spark-gap, an electrode having a metal percussion-plate, secured slightly back from the discharge-point thereof and extending laterally therefrom for producing an even, uniform discharge of an alternating current.

13. An electric spark-gap, having a percussion-plate mounted on opposite sides of its discharge-point slightly back from the point thereof, and extending transversely to the direction of discharge.

14. An electric spark-gap, having an electrode provided with a conductor-plate mounted in contact therewith, slightly back from the point of discharge for preventing improper action in discharging an alternating current.

15. An electric spark-gap, comprising opposite electrodes, having discharge edges extending lengthwise, parallel to each other, and a percussion-plate mounted transversely to the air-gap between said electrodes and adjacent thereto, as and for the purpose set forth.

16. An electric spark-gap, comprising opposite electrodes having discharge edges extending lengthwise, parallel to each other, and opposite percussion-plates, mounted transversely to the air-gap between said electrodes and adjacent thereto, said percussion-plates restricting the active area of the electrode to the edges thereof.

17. An electric spark-gap, having an electrode provided with a central discharge-point of small area and adjacent receptive portions of large area, of conductive material extending in planes approximately at right angles to the direction of discharge.

18. An electric spark-gap, having a gap formed by laterally-extended discharge parts, and a percussion-plate coextensive with said gap.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
R. S. FORD.

No. 774,759. PATENTED NOV. 15, 1904.

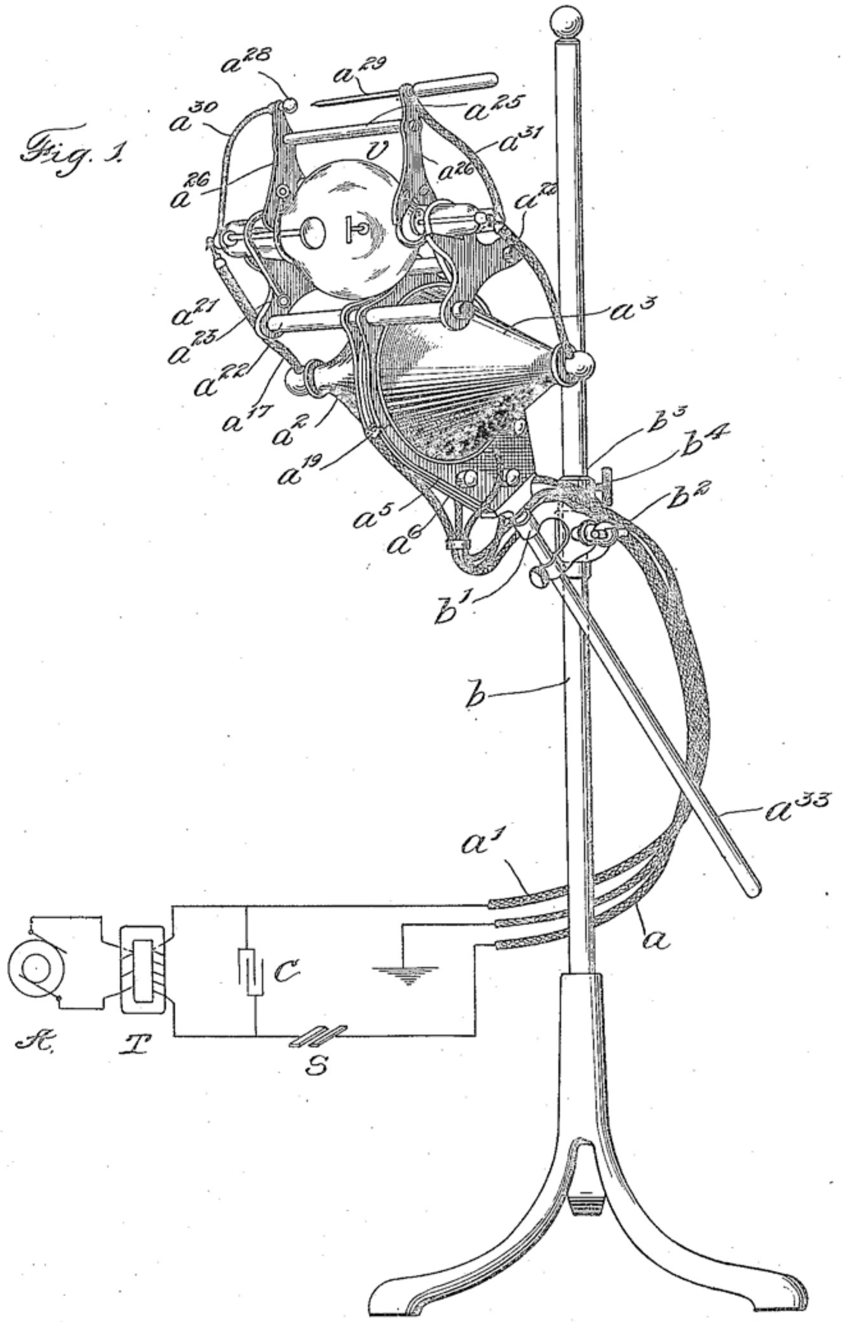
T. B. KINRAIDE.

PORTABLE HIGH FREQUENCY DEVICE AND VACUUM TUBE STAND.

APPLICATION FILED JUNE 27, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



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S

Witnesses,

John E. Porter

Robert Ringrose.

Inventor,

Thomas B. Kinraide,

by Geo. H. Maxwell.

Attorney.

No. 774,759. PATENTED NOV. 15, 1904.

T. B. KINRAIDE.

PORTABLE HIGH FREQUENCY DEVICE AND VACUUM TUBE STAND.

APPLICATION FILED JUNE 27, 1904.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2

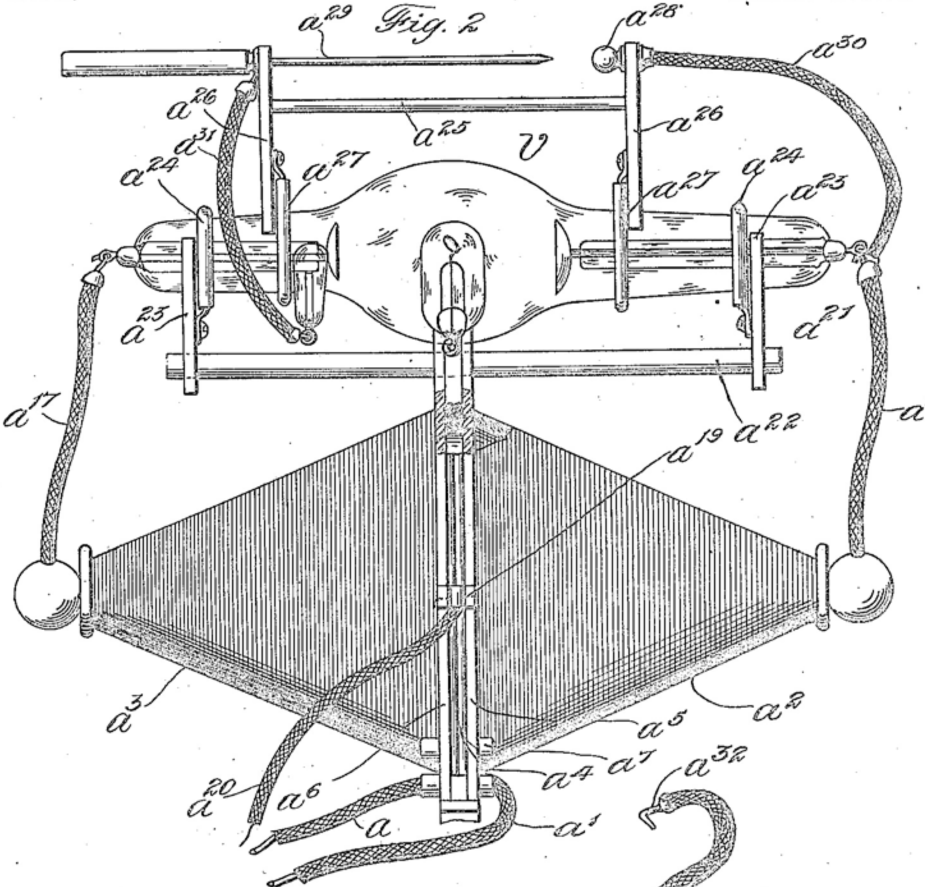
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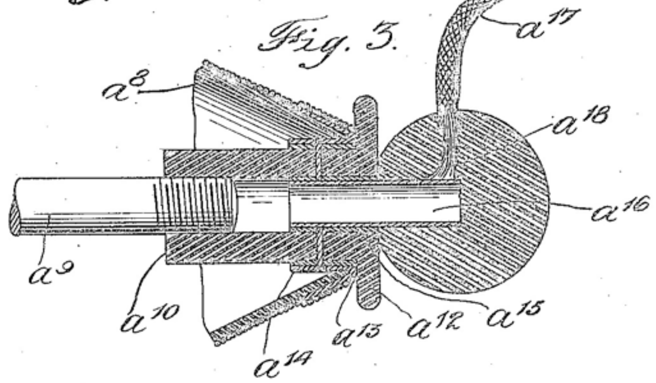
Fig. 3.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Witnesses,

John E. Porter.

Robert Ringrose.

Inventor,

Thomas B. Kinraide

by Geo. H. Maxwell

Attorney.

No. 774,759. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

PORTABLE HIGH-FREQUENCY DEVICE AND VACUUM-TUBE STAND.

SPECIFICATION forming part of Letters Patent No. 774,759, dated November 15, 1904.

Application filed June 27, 1904. Serial No. 214,266. (No model.)

To all whom it may concern:

Be it known that I, Thomas B. Kinraide, a citizen of the United States, and a resident of Boston, Massachusetts, have invented an Improvement in Portable High-Frequency Devices and Vacuum-Tube Stands, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is an apparatus for enabling a vacuum-tube or the like to reach the highest efficiency in connection with high-frequency currents of high potential, my invention being particularly intended for therapeutical purposes.

The transmission of high-potential currents along long conductors is very wasteful. For instance, in the ordinary static machine the transmission from the machine to an X-ray tube causes a loss of considerably over fifty per cent., and it is well known that high-potential current is very difficult to transmit without a great loss by atmospheric conduction, and this is still more true of high-frequency alternating current, the difficulty being greatest, and hence the waste of current greatest, with the strictly high-frequency currents of induction apparatus. The loss, and hence the difficulty of transmission, increases with the increase of frequency, so that in therapeutical work (for which my invention is particularly adapted, as above mentioned) it becomes practically impossible to transmit the effects from the ordinary high-frequency apparatus to the patient or other object, even ten feet of the best insulated conductor practically dissipating the output. The result is that the so-called "high-frequency" apparatus falls far short of producing proper high-frequency results. Another serious objection resulting from the transmission of this high-potential current over long conductors (as heretofore necessary) is the danger to the patient, apparatus, and operator from the heavily-charged conductor-wires, and hence requiring great skill in their handling and a constant nervous strain upon the operator in doing so.

My invention has for its objects the obviating of the aforesaid difficulties and objections by providing an apparatus which can be operated without any danger to the patient or anxiety on the part of the operator, requiring little skill or technical knowledge in its use, working with very slight dissipation of current, and at the same time not being liable to break down or give out with careless handling. Besides, my invention provides a superior current and is attractive in appearance and convenient to manipulate.

Stated broadly, my invention, so far as it relates to the avoidance of loss of current, resides in mounting the X-ray tube directly on the secondary itself, thereby eliminating the usual conductors, inasmuch as the terminals of the secondary are directly connected with the terminals of the X-ray tube, and that feature of my invention which resides in its convenient portability consists in operating the high-frequency induction device—*i. e.*, the induction-coil, resonator, or the like—at a distance from the high-frequency generator, so that all the heavy portions of the apparatus remain stationary, while the induction device and tube are mounted together for direct use wherever required.

Other features of my invention and the various constructional details of the invention in its embodiment as herein shown will be pointed out in the course of the following description.

In the drawings, in which I have shown one only of many embodiments of my invention, Figure 1 is a perspective view thereof. Fig. 2 is a view in elevation looking at the rear side of the apparatus as shown in Fig. 1. Fig. 3 is an enlarged sectional detail showing the construction of one of the terminals of the apparatus.

This invention relates to high-frequency apparatus of the most advanced type, and by the terms "high frequency" and "high potential" as herein used I refer to currents capable of producing a disruptive or brush discharge into the air from spherical electrodes at least one inch to one and one-half inches in diameter, or, defined otherwise, my invention relates to currents which cannot be conducted (at least not in the usual manner) over a conductor-wire, as commonly practiced with ordinary currents, but will dissipate themselves in the air in spite of any usual insulation. This high-frequency high-potential current because of the impossibility of conducting it has heretofore been incapable of practical and successful use for such purposes as those hereinbefore mentioned, because almost entirely lost in the air before reaching the translating device, (at the patient, for example,) said dissipation being, moreover, exceedingly dangerous to the operator; and it is the object of my invention to render available without danger or loss of current the kind of current which I have just defined. I have succeeded in securing the desired result, not by rendering the current any more transmissible than before, but by separating the essential parts of the apparatus in such manner and providing such construction that the exceedingly high frequency and high-potential current, with its attendant danger and difficulty, need not be transmitted, but is developed directly at and in connection with the portable translating device operated by a stationary and remote generating source comprising the heavier and more cumbersome portions of the apparatus, which are capable of transmitting without danger to the portable portion the proper current for operating the latter to produce the dangerous and non-transmissible current first defined.

The high-frequency generator or source of high-frequency current may be of any usual or preferred kind, being herein diagrammatically represented as comprising an alternator A, transformer T, condenser C, spark-gap S, (the latter being indicated as of the kind contained in my application Serial No. 209,686.) From this source of high-frequency energy conductors a a' lead to the "tube-stand," (by which term I mean to include any device carrying the vacuum-tube or other translating device.) As herein illustrated said tube-stand is mounted for convenience on a standard or rod b. As already stated, the tube-stand consists of a "high-frequency" device, (by which term I mean to include any device capable of high-frequency discharge,) and, as herein shown, this high-frequency device is composed of two conical secondaries a^2 a^3, extending coaxially in opposite directions from a common primary a^4. The general construction and advantages of the conical form of secondaries are set forth in my copending application, Serial No. 209,684, filed May 25, 1904. While I do not limit my invention to any definite use or capacity, a convenient construction includes a coarse winding of four turns, whose terminals connect to the respective conductors a a', and a fine winding of No. 30 triple-wound secondary.

The bases of the secondary coils are arranged adjacent to each other and separated from the common primary a^4, wound in a peripheral groove formed between plates a^5 a^6 and held in rigid position by suitable means, as bolts a^7. These secondaries are wound on hollow insulating shells or supports a^8 and held together by a tie-rod a^9 passing through the plates a^5 a^6 and having threaded engagement at its ends with opposite ferrules a^{10}, (one only being shown in Fig. 3, as the construction is the same at the opposite ends of the apparatus,) whose heads a^{12} engage the outer ends of the cones a^8, thereby clamping the high-frequency device together. At their smaller ends each cone is provided with a conductor-plate a^{13}, connected by a pin or strip of conductive material a^{14} to a contact-plate a^{15} for tightly receiving a metal sleeve or post a^{16}, to the outer end of which is soldered or suitably secured the secondary-terminal a^{17}, as indicated at a^{18}, within a ball of insulating material. The opposite terminals of the two secondaries are connected together, as indicated at a^{19}, and grounded by a wire a^{20}.

The plates a^5 a^6 carry a frame a^{21}, shown as comprising a pair of rods a^{22}, supported in said plates, and end supports a^{23}, notched at their upper ends, as plainly shown in Fig. 1, for receiving the vacuum-tube V or other translating device operated in connection with the apparatus. In the drawings I have shown one well-known form of X-ray tube as mounted in the frame a^{21}, said tube being held in position by heavy rubber straps a^{24}, connected at their free ends to the supports a^{23} and passed yieldingly about the ends of the vacuum-tube. On the latter is a bridge-frame consisting of a rod a^{25} and inverted-**Y** supports a^{26}, held in place by heavy rubber straps a^{27}, similar in construction and arrangement to the straps a^{24}. This bridge-frame carries opposite electrodes a^{28} a^{29}, connected by wires a^{30} a^{31} to the vacuum-tube for regulating the vacuum therein in well-known manner. The opposite secondary-terminals a^{17} are provided with hooks a^{32} for quick connection with the translating device.

The tube-stand is provided at its lower end with a handle a^{33}, shown as slidingly mounted in a bracket b', adjustably secured by a hand-screw b^2 to a slide b^3, clamped by a thumb-screw b^4 to the standard b.

In use it will be seen that, in the first place, the X-ray tube is mounted directly on the high-frequency device instead of being mounted at a distance on a separate stand, as has heretofore been the practice. By this means separate conductors are entirely eliminated, it being necessary merely to extend the terminals proper of the high-frequency device the short distance required in order to reach the translating device, mounted as close thereto as the shape of the respective parts will permit. By this means the energy of the high-frequency device is not dissipated, but is directly transferred to the X-ray tube, thereby giving an efficiency hitherto not obtainable. In the next place, the high-frequency device is light and portable, inasmuch as the heavier parts of the apparatus are separated therefrom, being ordinarily kept in a heavy cabinet considerably removed from the operating chair, table, or, it may be, from the room itself.

By the arrangement of the mechanism herein set forth as the preferred embodiment of my invention one primary serves for two secondaries, and also by having the secondaries arranged as shown, in which a single layer of fine wire is provided, the liability of sparking from turn to turn is eliminated and the discharge-terminal is removed from the primary, the resistance decreases with each turn, and it is possible to get more turns than in any other form with a single layer, &c., as explained in my before-mentioned conical-coil application.

The yielding holders a^{24} a^{27} permit the translating device to be turned readily without disarranging the connections, as has heretofore been necessary.

As already intimated, I do not intend to restrict myself to the precise construction herein set forth as the preferred embodiment of my invention, as many changes in form, arrangement, and relation of parts may be resorted to without departing from the spirit and scope of my invention as defined in the broader claims hereinafter contained. I regard my invention as broadly new in a number of particulars, as will appear more definitely in the following claims.

My invention has no relation in any way to low-frequency hand devices and portable cabinets operated by primary batteries and the like nor to the induction devices which were commonly used in connection with ordinary currents a few years ago, but is restricted to that class of apparatus, as previously defined, of which the current is of such a high frequency and high potential as to be practically non-transmissible, for the reasons already stated, over a usual conductor, said current having a high frequency and high potential capable of a disruptive brush discharge, as already stated.

Having described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The herewith-described means of rendering the described kind of current available with the highest efficiency directly at the point of use, consisting in the combination of a stationary generating source of high-frequency current, with an independently mounted and inclosed device capable of developing therefrom a high-potential and high-frequency current of the kind described, said device being capable of hand manipulation for direct application of said current and connected to said stationary source by a long flexible conductor permitting it to be readily moved about the room or patient without disturbing said stationary source.

2. The combination with a stationary source of high-frequency current, of a portable induction-coil operating in connection therewith to develop high-frequency high-potential current of the kind described, and a long flexible conductor supplying current from said source to the primary of said coil.

3. A high-frequency apparatus having a high-potential high-frequency disruptive discharge device movable independently of the rest of the apparatus for permitting local application or the like.

4. In an apparatus of the kind described, comprising a source of high-frequency current, and remote high-frequency device operated thereby, and a frame carried by said device for supporting a translating device in close proximity thereto.

5. In an apparatus of the kind described, comprising a source of high-frequency current, a high-frequency device, having a central partition, terminals at the opposite sides of said partition, a frame carried by said partition transversely thereof for supporting a translating device, and means for connecting the latter directly with said terminals.

6. In an apparatus of the kind described, comprising a source of high-frequency current, a high-frequency device, a flexible conductor engaging the two, means for connecting the terminals of said high-frequency device directly to a translating device, and means for moving said translating device and high-frequency device together.

7. In an apparatus of the kind described, comprising a source of high-frequency current, a high-frequency device, a flexible conductor engaging the two, means for connecting the terminals of said high-frequency device directly to a translating device, and a handle extending from said high-frequency device for adjusting and moving the same and said translating device together.

8. A high-frequency device, comprising a primary, and a pair of independent secondaries operated by said single primary.

9. A high-frequency device, comprising an intermediate coarse primary, and opposite fine secondaries, operated thereby, having their discharge-electrodes remote from said primary.

10. A high-frequency device, comprising a primary, and opposite conical secondaries.

11. A high-frequency device, comprising a conical support, a secondary wound thereon, a peripheral groove at the base of said support, and a primary held in said groove.

12. A high-frequency device, comprising a primary, insulating-plates on opposite sides thereof, opposite secondaries outside of said plates, and retaining means therefor.

13. A high-frequency device, comprising a primary, retaining-plates therefor, opposite

conical secondaries extending coaxially in opposite directions therefrom, and an axial tie-rod binding all of said parts.

14. A high-frequency device, comprising a primary, a conical secondary operated thereby, a tie-rod, a ferrule binding said parts together, said ferrule having external and internal contact-plates electrically connected together and with said secondary.

15. In a high-frequency device, a conical secondary, having a discharge-terminal consisting of a ferrule having an internal contact-plate electrically connected with the smallest turn of said secondary, a removable conductor-post fitting against said contact-plate and having, adjacent the end of said ferrule, a short terminal wire permanently secured thereto.

16. In a high-frequency device, a conical secondary, having a discharge-terminal, consisting of a ferrule having an internal plate electrically connected with the smallest turn of said secondary, a removable conductor-post fitting against said contact-plate and having, adjacent the end of said ferrule, a short terminal wire permanently secured thereto in a ball of insulating material.

17. A high-frequency device, having a frame mounted directly thereon, and provided with means for securing a vacuum-tube thereto.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
E. G. PROCTOR.

No. 774,760. PATENTED NOV. 15, 1904.

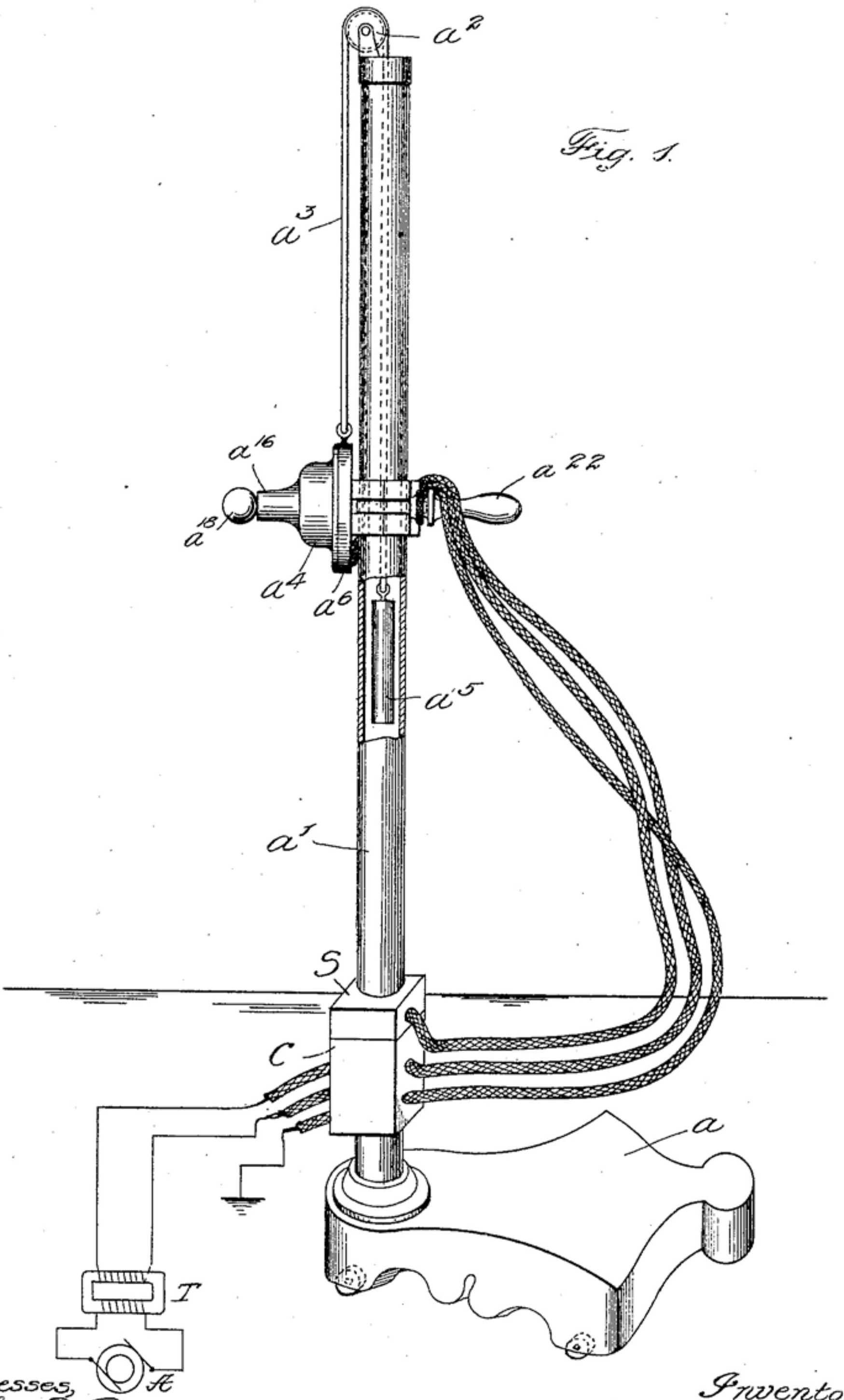
T. B. KINRAIDE.

SELF CONTAINED HAND ELECTRODE.

APPLICATION FILED JULY 5, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses,
John E. Porter.
Robert Ringrose.

Inventor,
Thomas B. Kinraide.
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No. 774,760. PATENTED NOV. 15, 1904.

T. B. KINRAIDE.

SELF CONTAINED HAND ELECTRODE.

APPLICATION FILED JULY 5, 1904.

NO MODEL. 2 SHEETS—SHEET 2.

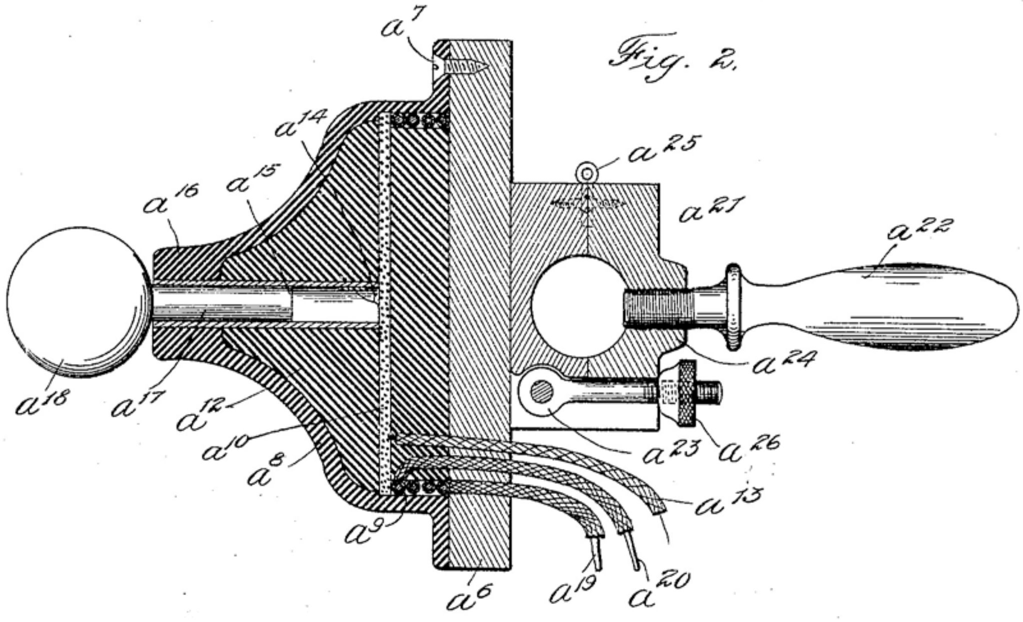

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Fig. 2.

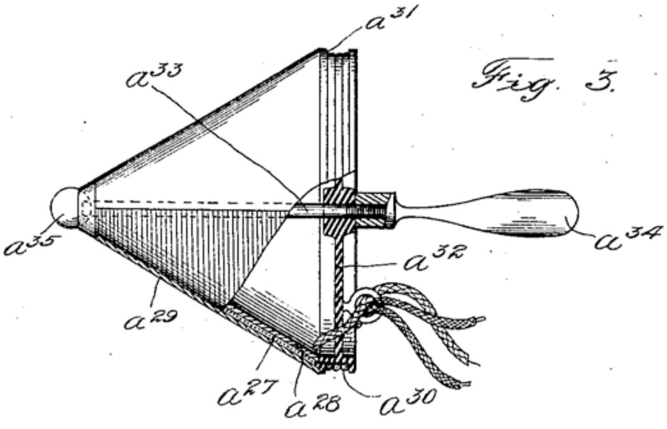

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Fig. 3.

Witnesses

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PHOTO-LITHOGRAPHED BY SACKETT & WILHELMS LITHO. & PTG. CO. NEW YORK.

No. 774,760. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

SELF-CONTAINED HAND-ELECTRODE.

SPECIFICATION forming part of Letters Patent No. 774,760, dated November 15, 1904.

Application filed July 5, 1904. Serial No. 215,278. (No model.)

To all whom it may concern:

Be it known that I, Thomas B. Kinraide, a citizen of the United States, and a resident of Boston, Massachusetts, have invented an Improvement in Self-Contained Hand-Electrodes, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The value and importance of electricity in the treatment of disease have recently gained wide recognition, especially in connection with the employment of high-frequency current. One serious difficulty, however, has been the adaptation or provision of means for rendering it practicable to employ very high frequency currents for local application. One difficulty has been the danger or discomfort likely to attend the application of this kind of current, and another difficulty has been the loss of current due to the action of atmospheric conduction on the conducting-wires leading from the high-frequency device to the patient, and a third serious difficulty has resided in the cumbersome apparatus, it having heretofore been necessary to move the entire generating apparatus to the patient or else move the patient to the apparatus.

It is the object of my present invention to obviate all these difficulties, besides providing various other advantages. I accomplish my object by providing a high-potential high-frequency disruptive discharge device operated by hand and readily movable independently of the generating source of the high-frequency current, so that the operator can manipulate the hand device the same as he has heretofore manipulated the usual hand-electrode and can now do so with my invention without the danger, inconvenience, or loss of current heretofore experienced.

The preferred form of my invention which I have herein shown is especially adapted for prolonged application as a head-terminal or for use above the patient, and I have also shown a form of my invention adapted for short and general application and for delicate manipulation and difficult cases of local application.

In the drawings, Figure 1 is a view in side elevation of one form of my invention. Fig. 2 is a transverse sectional view thereof on the line 2 2, Fig. 1. Fig. 3 is a view in side elevation of a modified form, parts being broken away for clearness of illustration.

One of the distinctive features of my present invention is the provision of a hand-electrode constituting in itself a high-frequency device, Figs. 1 and 2 showing the same as capable of being moved by hand up and down on a standard or removed therefrom and handled separately and Fig. 3 showing a lighter form of device for hand use only.

I wish it understood that my invention is restricted to high-frequency high-potential current of the kind previously mentioned, by which I mean current of such enormous frequency and high potential that it cannot readily be conducted because of its tendency to discharge into the air in spite of any usual insulation, my invention residing in providing means whereby that portion of the apparatus which is to be carried or moved by the hand of the operator is separated from the rest of the apparatus and contains within itself that portion of the winding or other mechanism which serves to transform the high-frequency transmissible current into the kind of current which is not transmissible and which I have defined as a high-frequency high-potential disruptive discharge-current.

On a suitable base a is rigidly secured a hollow standard a', provided with a pulley a^2, swiveled at its upper end, over which passes a cord a^3, carrying a hand-electrode high-frequency device a^4 at its outer end and a counterbalance-weight a^5 at its inner end.

The electrode a^4 comprises a back piece a^6, to which is secured at a^7 a shell of hard rubber or the like a^8, containing a coarse primary a^9, wound adjacent the outer turns of a flat secondary a^{10} of the form shown in my patent, Serial No. 615,653, of December 6, 1898, all embedded in insulating material, such as hard wax a^{12}, poured therein in melted condition. One terminal, a^{13}, of the secondary is shown as grounded, and the other or inner terminal, which constitutes the high-potential discharge-terminal of the secondary, is connected at a^{14} to a tubular contact device a^{15}, permanently secured in the pointed end a^{16} of the high-frequency device for receiving any desired form of discharge-electrode, the shank a^{17} of a ball-discharge electrode a^{18} being herein shown as mounted therein. The terminals of the primary are connected by suitable flexible conductors a^{19} a^{20} to a suitable source of electrical energy, shown as comprising a generator A of alternating current, whose conductors lead to a transformer T, connecting with a condenser C and spark-gap S. In my copending application, Serial No. 214,266, I have explained more at length the advantages of having the high-frequency device separated from the generating source, and in the present arrangement I have separated the parts still farther, the alternator and transformer, which serve to generate the low-frequency high-voltage current and which constitute the heavier portions of the generating apparatus, being separated a long distance from the movable portion of the apparatus, and the condenser and spark-gap, which serve to raise the low-frequency current to a high-frequency current, being mounted, preferably, directly on the standard a', thereby bringing as near to the discharge-electrode as practicable all that portion of the current which has any tendency to dissipate itself in the atmosphere by conduction. This also brings all the adjustable parts of the apparatus directly to the hand of the operator.

The arrangement as thus described is of great importance in therapeutical work, because it makes it possible to use the highest frequency and most powerful and efficient current without deterioration wherever it is desired to quickly shift the electrode, as the surgeon can readily move the standard a' here and there about the room without any inconvenience, the heavy generating parts being connected by long conductors and located in a closet or other convenient place, and as the operator is using the apparatus he can instantly adjust the hand-electrode up or down or sidewise and likewise adjust the spark-gap or condenser, all without leaving the patient or otherwise interrupting the treatment.

The back a^{6} of the high-frequency device is provided with a clamp a^{21} and operating-handle a^{22}, said clamp being shown as consisting of two blocks a^{23} a^{24}, hinged at a^{25} and locked together by a thumb-nut a^{26}, although I do not restrict myself in any way to the means which may be provided for retaining the high-frequency device movably upon its standard.

From the above description it will be understood that the high-frequency generator may be located in the corner of the room or elsewhere, as desired, transmitting the current generated thereby to the high-frequency device over the conductors a^{14} a^{20} without danger or material loss of current, inasmuch as the form of the current as delivered from the source mentioned is of such well-known character that it is readily restrained by the ordinary insulation provided with good conductor-wires. The current having been delivered properly to hand-electrode a^{4}, which I have denominated the "high-frequency device," is raised by the latter to the enormous frequency and high voltage required for the disruptive discharge desired in this class of apparatus, and by my invention the high-frequency device itself is the electrode and is movable directly to the position required for local application. The truck or standard is readily moved to the operating-table or wherever required, and the hand device is swung on the rod a' to any direction desired and is readily raised or lowered. This, for instance, enables it to be used with a head-terminal for prolonged application, which would otherwise be practically impossible with the ordinary apparatus because of the fatigue resulting to the operator, whereas by my invention the operator is relieved of all fatigue and also the element of danger, and hence nervous anxiety on the part of the operator is practically eliminated, inasmuch as there are no conductor-wires from the high-frequency device, (which have heretofore constituted the source of danger.)

In case the application of the high-frequency disruptive discharge is to be of short duration, and especially if the application is to be with reference to an awkward position, the operator simply unclamps the device a^{4} from its standard and holds it in his hand to the spot desired. For the latter purpose I also provide a lighter form of construction, as shown in Fig. 3, where it will be seen that I have provided a conical secondary a^{27}, wound on a light supporting-shell a^{28}, and preferably inclosed by an outer cone a^{29}, the primary a^{30} being wound in a peripheral recess or groove a^{31}, provided in a base a^{32}, the parts being held together in any desired manner, as by a rod a^{33}, having threaded engagement with the handle a^{34} and adapted to receive any kind of a discharge-electrode at its opposite end, as a ball a^{35}. This form of hand device is light and well adapted to general use and lends itself to more delicate manipulation than the heavier form of hand devices previously described.

It will be understood my invention is capable of a wide variety of embodiments, as I believe it is broadly new to provide a hand device or electrode which itself produces the high-potential high-frequency current that causes the disruptive discharge delivered by the electrode.

The current supplied to this hand device or hand-electrode is a high-frequency current, but is not of that quality which renders it dangerous and practically non-transmissible, the mechanism which transforms said current into the latter kind of current being contained within the electrode itself, whereby all necessity for further conductors, and hence loss of current and danger, &c., are eliminated, the current not being permitted to assume this condition until it reaches the device which is to be carried or manipulated by the operator directly at the applying-point. I have already pointed out that the current to which my invention relates is not the ordinary current, and I wish to repeat that my invention relates to the most advanced type of high-frequency current known to therapeutical practice at the present day, being distinguished by its ability to produce a disruptive or brush discharge into the air from spherical conductors of one inch to one and one-half inches in diameter. I take this means of defining the character of the current, although it will readily be understood that it can be recognized by various other distinctive features and characteristics, and accordingly I do not intend to restrict myself by these definitions to any arbitrary frequency or potential, but have undertaken merely to explain the field of usefulness and kind of current with sufficient clearness to enable those skilled in the art to apprehend with certainty what my invention is, the difficulties it is intended to overcome, and the advantages effected thereby.

I am aware that it has long been common to employ hand-electrodes; but so far as I am aware these have either been remote from the producer of the form of current discharged or else they have not been capable of delivering the kind of discharge herein provided for. It will therefore be understood that I am not restricted in any way (excepting as specified in the claims) to the constructional details herein set forth.

Having described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A hand device or electrode for hand manipulation at the point of application, comprising a portable inclosure provided with a carrying device adapted to be grasped by the hand, said portable inclosure adapted to be connected to a source of high-frequency current, and containing within itself means for developing from said current a high-frequency high-potential disruptive discharge-current of the kind described.

2. A source of high-frequency current, and portable means for producing therefrom a high-potential high-frequency disruptive discharge-current of the kind described, said means being connected to said source by a long flexible conductor and being light in weight and small in size for carrying by hand and for hand application and manipulation.

3. A standard, provided with a hand-electrode movable up and down on said standard and containing a high-frequency induction device.

4. A portable standard or support, carrying a disruptive discharge-electrode provided within itself with a high-potential high-frequency coil.

5. A portable standard or support, carrying a disruptive discharge-electrode provided within itself with a high-potential high-frequency coil, said electrode being freely movable by hand with relation to said standard.

6. An electrode, containing an induction-coil, a hollow support therefor, on which said electrode is freely movable, and counterbalancing means within said support for said electrode.

7. A high-frequency induction device for therapeutical work, comprising a portable standard, a hand-electrode, containing a high-frequency high-potential induction-coil, mounted movably on said standard, and a generating source comprising a source of alternating current, transformer, condenser and spark-gap, the latter two being mounted on said portable standard and having a short connection to said hand-electrode, and said transformer and source of alternating current being remote from said standard.

8. A high-frequency induction device for therapeutical work, comprising a portable standard, a hand-electrode containing within itself means for producing from an ordinary high-frequency current a high-frequency, high-potential disruptive discharge-current, a condenser and spark-gap in the circuit thereof, mounted adjacent thereto, and a remote source of current therefor including a transformer.

9. In an apparatus in the kind described, a stationary alternator and transformer located remote from the rest of the apparatus, and a high-frequency translating device, spark-gap and condenser located close to each other connected by short conductors for operation in connection with said remote alternator and transformer.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. KINRAIDE.

Witnesses:
Geo. H. Maxwell,
E. G. Proctor.

No. 785,671. PATENTED MAR. 21, 1905.

H. JACKSON.

DETONATOR OR AUXILIARY PROTECTIVE ALARM SPARK GAP FOR HIGH FREQUENCY APPARATUS.

APPLICATION FILED JULY 27, 1904.

Fig. 1.

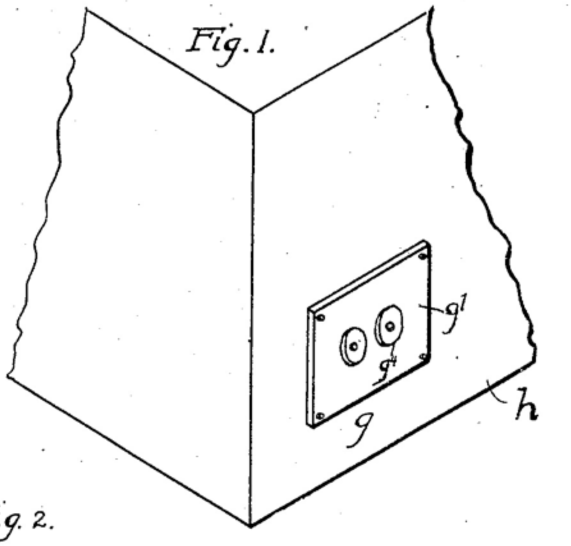

Fig. 2.

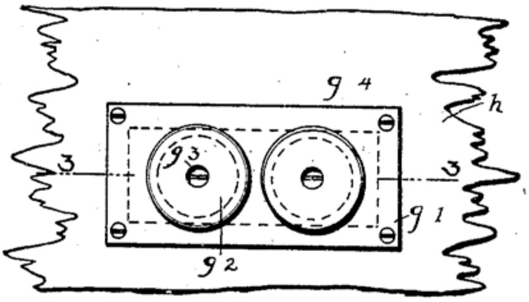
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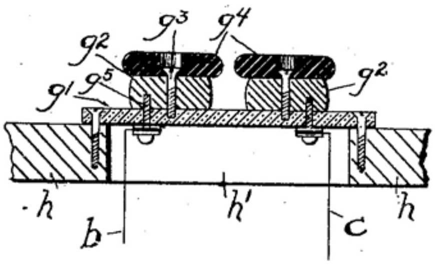
Fig. 3.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h'
c
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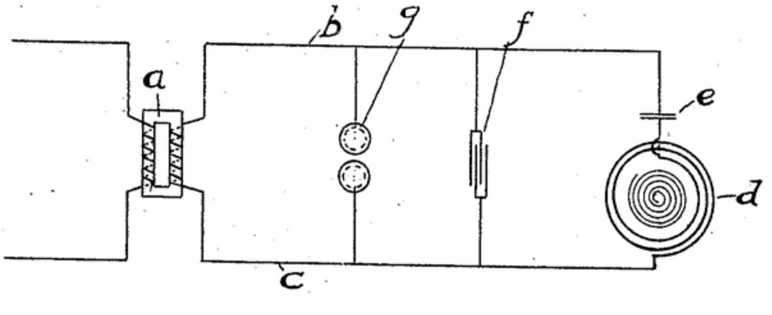
Fig. 4.



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J. B. Jackson.

INVENTOR
Howard Jackson
BY Geo. H. Maxwell
ATTY.

PHOTO-LITHOGRAPHED BY SACKETT & WILHELMS LITHO. & PTG. CO. NEW YORK.

UNITED STATES PATENT OFFICE.

HOWARD JACKSON, OF NEWTON, MASSACHUSETTS.

DETONATOR OR AUXILIARY PROTECTIVE ALARM SPARK-GAP FOR HIGH-FREQUENCY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 785,671, dated March 21, 1905.

Application filed July 27, 1904. Serial No. 218,438.

To all whom it may concern:

Be it known that I, HOWARD JACKSON, a citizen of the United States, and a resident of Newton, Massachusetts, have invented an Improvement in Detonators or Auxiliary Protective Alarm Spark-Gaps for High-Frequency Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The increased efficiency of high-frequency apparatus of the kind employed in connection with X-ray work, therapeutical work, and the like has occasioned the placing in the hands of novices and the unskilled of apparatuses more or less complex and requiring heavy and dangerous currents; and the present invention has for its object the provision of protecting mechanism for the apparatus in the form of means for automatically notifying the user of such apparatus in case anything goes wrong.

My invention includes in its preferred embodiment means for promptly notifying the user both by sound and sight and also by the sense of smell whenever an open circuit or other breakdown occurs.

The constructional details of my invention and the operation thereof and further resulting advantages will appear more fully in the course of the following description, reference being had to the accompanying drawings, in which I have illustrated one embodiment of my invention.

In the drawings, Figure 1 is a fragmentary view of a cabinet, showing my invention applied thereto. Fig. 2 is an enlarged front elevation thereof. Fig. 3 is a cross-sectional view taken on the line 3 3, Fig. 2. Fig. 4 is a diagrammatical view showing the circuit connections

In many ways a breakdown is liable to occur in the use of the kind of apparatus in question—as, for example, if the spark-gap be improperly connected or accidentally omitted (as it often is for removal in cleaning or renewing) and the current is turned on the back discharge from the condenser will break down the insulation of the transformer—or the conductors from the condenser to the induction-coil or step-up transformer may become detached or imperfectly attached, in which case the whole output is thrown into the condenser and not having any other path to discharge excepting through the transformer immediately punctures the insulation thereof, as before. Accordingly I have provided an auxiliary device in the form of a spark-gap permanently in circuit and so situated as to be plainly visible at all times, being preferably on the outside of the box or case in which the apparatus is situated and also preferably containing means for giving off an offensive or pungent odor when heated, said auxiliary spark-gap being so adjusted as to be inoperative when the main circuit is working normally, but becoming operative instantly when the main circuit operates abnormally.

My invention is capable of a wide variety of embodiments, the form herein shown, however, being preferred because of its neat appearance, compact arrangement, and certainty and efficiency of action.

Referring to Fig. 4, I have indicated a transformer *a*, connected by wires *b c* to an induction-coil *d*, a Kinraide coil being shown for convenience, (see Patent No. 615,653, December 6, 1898,) operated in connection with a spark-gap *e* and a condenser *f* in the usual manner. I introduce across the circuit an auxiliary spark-gap or detonator *g*, being herein shown as between the transformer *a* and the condenser *f*, although it is obvious that it may be on the other side thereof or otherwise located, provided it is connected around the part or parts which are liable to cause the trouble. The constructional details of the preferred embodiment of this auxiliary spark-gap or detonator are shown best in Figs. 2 and 3, where it will be seen that the box or cabinet *h* is cut away at *h'* to provide a free and unrestricted opening to the interior, and over this opening *h'* I secure a heavy insulating-block *g'*, of porcelain, glass, or other suitable non-inflammable material, on which are mounted opposite electrodes or discharge-buttons g^2, shown as retained by screws g^3, which also serve to retain protectors g^4 of hard rubber or other insulating and odoriferous material. Binding-posts g^5 connect the wires *b c* at their inner ends and engage the electrodes g^2 as far apart as possible to prevent any danger of sparking across on the inside of the box. To make a distinctive and very loud noise and also to prevent any preliminary brush discharges, which might cause a sudden discharge, tending to annoy and interfere with the steadiness of the main apparatus, I make the electrodes g^2 g^2 circular in form, with rounded edges. This permits the electrodes to be brought almost as close together as the plates of the main spark-gap, without any tendency, however, to operate during the normal operation of the apparatus. The protectors g^4 are the same shape as the electrodes g^2 and overhang the latter, so as to prevent the operator from accidentally coming in contact with said electrodes, and yet leave the latter sufficiently exposed to permit the free circulation of air and to permit the arc to be visible whenever the detonator is called into action. The electrodes g^2 g^2 are adjusted apart sufficiently to provide a slightly greater resistance than that of the coil d and spark-gap e, which carry the oscillating current from the condenser, the adjustment of the device g determining the amount of strain that can be thrown upon the apparatus. This amount of strain will usually be greater or less, according to the character of the insulation of the transformer a. The latter is one of the most expensive portions of such an apparatus, and hence it is desirable to protect it in any event, and therefore the electrodes g^2 g^2 are usually adjusted from each other such a distance as to give prompt notice of any back discharge from the condenser or other similar danger liable to break down the insulation of the transformer.

In use if the apparatus is in proper condition, with all the parts properly adjusted and connected, the current passes in usual manner from the transformer a by the conductors b c to the condenser, whose discharges are passed through the coil d by the action of the spark-cap e. If now anything should occur to increase the resistance of the circuit or cause a breakdown therein, the current will immediately set the detonator g in operation, preferring this path of relatively low resistance to overcoming the impedance of the transformer, causing a loud and startling noise because of the discharge between the electrodes g^2 g^2, and as the device g is in plain sight the blinding light therefrom will also attract attention, and simultaneously therewith the smoking of the rubber protectors g^4 will compel attention by the sense of smell. Thereupon the operator instantly shuts off the current and is then at liberty to investigate at his leisure the cause of the trouble.

It will be evident that the apparatus may be guarded with any degree of nicety desired, according to the distance apart of the electrodes g^2 g^2. The auxiliary spark-gap or detonator remains idle or inactive at all times during the proper running of the apparatus to which it is applied, but is ever present and effective for warning the operator of any dangerous tendency of the condenser-current to flow back to the transformer. It does not depend in any way upon any special winding or contain any spring-actuated device or other movable parts; but it consists simply of a spark-gap not requiring any skill or understanding or attention on the part of the operator.

As already intimated, I am aware that many changes in form, arrangement, and combination of parts may be resorted to without departing from the spirit and scope of my invention.

Having fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. An apparatus of the kind described, comprising an electric circuit, a cabinet, containing means for impressing thereon a high-frequency current, and a translating device, and means mounted on said cabinet in open view for giving instant visual warning upon the flow of destructive abnormal current, said means being protected from accidental contact.

2. A high-frequency cabinet for therapeutical work and the like, containing circuit-wires leading from a suitable source of current, a high-frequency high-potential disruptive discharge mechanism within said cabinet to operate in connection with said circuit, and an auxiliary detonator in parallel with said mechanism at the high-frequency high-potential end of said circuit, for giving instant audible warning upon the flow of destructive abnormal current.

3. A high-frequency cabinet for therapeutical work and the like, containing circuit-wires leading from a suitable source of current, a high-frequency high-potential disruptive-discharge mechanism within said cabinet to operate in connection with said circuit, and means responsive to the flow of destructive abnormal current for generating instantly a volume of bad-smelling gas or smoke capable of immediately permeating the atmosphere to the distance usually occupied by the operator, for giving warning to said operator by the sense of smell, said gas-generating means being mounted in an exposed position on said cabinet whence the said gas can freely escape in large volumes for the purpose set forth.

4. A high-frequency device for therapeutical work and the like, comprising a cabinet, containing a transformer, a condenser, a spark-gap device, and a translating device, and an electric circuit connecting said apparatus for producing a high-frequency high-potential disruptive discharge, and an auxiliary spark-gap device mounted on the outside of said cabinet and connected across said circuit between said transformer and said translating device, said auxiliary device being normally

inactive but capable of instant operation upon the flow of abnormal current for giving warning to the operator for preventing damage to the transformer.

5. A case containing electrical apparatus and having an aperture therethrough, a noninflammable insulating-plate secured thereto, a spark-gap device mounted on said plate, and overhanging protecting means for said spark-gap.

6. A spark-gap device, comprising a support of non-inflammable insulating material, opposite electrodes mounted flat against the top surface thereof, and overhanging protectors mounted directly on said electrodes for preventing accidental contact therewith while leaving the spark-gap exposed and visible.

7. A spark-gap device, comprising a support of non-inflammable insulating material, opposite electrodes mounted thereon, and protectors mounted on said electrodes projecting over the discharge-gap, said protectors being composed of odoriferous material becoming active in the presence of the arc from said electrodes.

8. A spark-gap device, having separated electrodes provided adjacent their discharge ends with material capable of emitting an odoriferous smoke when heated by the discharge, for giving warning to the operator.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HOWARD JACKSON.

Witnesses:
GEO. H. MAXWELL,
EMILIO A. CARDARELLO.

T. B. KINRAIDE.

APPARATUS FOR FORMING A SMOOTH SURFACE ON METAL WHILE BEING MILLED.

APPLICATION FILED MAY 13, 1918.

1,336,239. **Patented Apr. 6, 1920.**

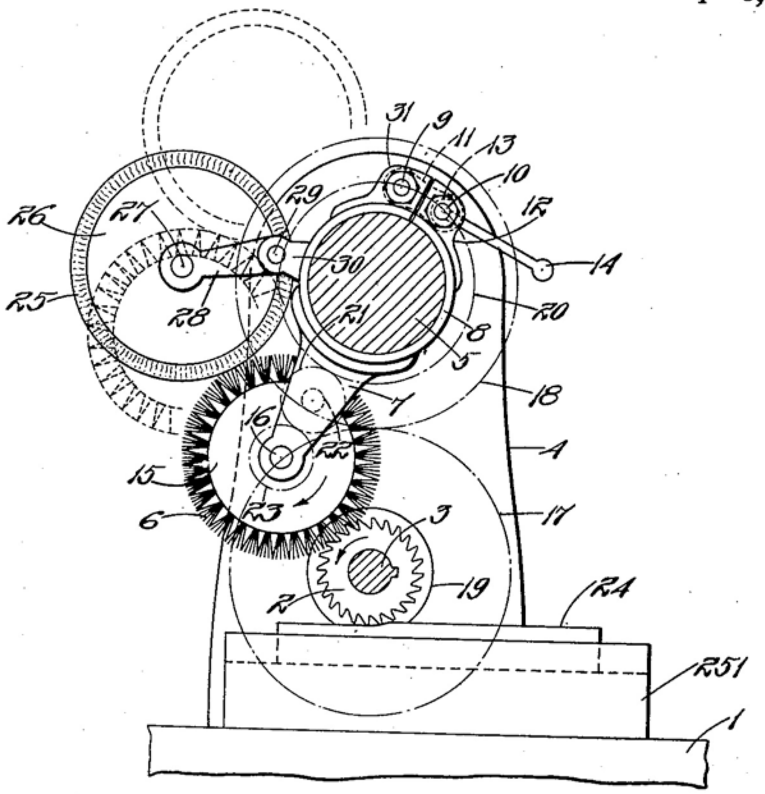
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Fig. 1.

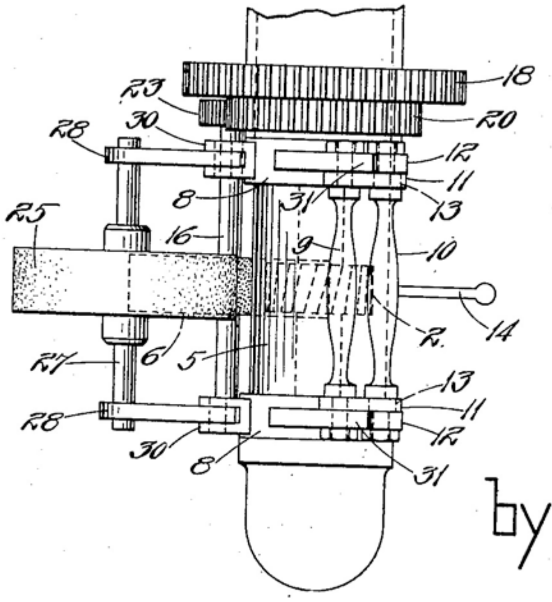
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Fig. 2.

Inventor:
Thomas B. Kinraide
by Macleod, Calver, Copeland & Dike
Attys.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

APPARATUS FOR FORMING A SMOOTH SURFACE ON METAL WHILE BEING MILLED.

1,336,239. Specification of Letters Patent. **Patented Apr. 6, 1920.**

Application filed May 13, 1918. Serial No. 234,260.

To all whom it may concern:

Be it known that I, Thomas B. Kinraide, a citizen of the United States, residing at Boston, county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Apparatus for Forming a Smooth Surface on Metal while being Milled, of which the following is a specification, reference being had therein to the accompanying drawings.

In the use of machines for milling down the surface of metallic bars or thinning down the bars to bring them to the requisite thickness, that is, surfacing them, as it is termed in the trade by the use of milling cutters, and of other cutters, it is well known that the chips formed by the cutter adhere to the cutting edges of the blades or teeth more or less, thus absolutely preventing a perfectly smooth surface being formed on the bar which is being worked, and in fact often times after a few turns of the cutter the chips accumulate so that by reason of their burring effect on the surface of the bar while the cutter is in operation, the surface of the bar becomes very much roughened. The softer the metal of the bar which is being worked, the rougher will be the surface after the cutter has been over it. This is noticeable to some extent in steel bars but it is especially noticeable in the softer metals such as aluminum, copper and lead. In copper and lead it is true to a very marked degree.

In many kinds of construction where metal bars are employed, it is extremely important, in fact absolutely necessary, that the surfaces shall be very smooth, for instance in the construction of crank cases for automobiles where it is important that the joints shall be very tight, the overlapping surfaces at their joints should be very smooth. It is also essential in aeroplane construction where aluminum is used to a considerable extent.

One object of the present invention is to provide a method of thinning down a metallic bar or plate and at the same operation forming a smooth surface on the face of the metal, said method consisting of surfacing the bar or plate by a cutter and clearing the cutting edge of the cutter automatically each time that the cutting edge passes out of contact with the metal plate before it again comes into operative contact with the plate.

Another object of the present invention is to provide an attachment for a milling machine which can be readily attached to the milling machines in ordinary use to automatically free the cutting edges of the blades of the milling cutter from the chips as fast as they are formed. Another object of the invention is to provide means for connecting the attachment with the milling machine in such manner that the cleaning device may be adjusted when desired, either in an operative position with relation to the milling cutter or out of operative position as desired.

The invention will be fully understood from the following description when taken in connection with the accompanying drawings and the novel features thereof will be pointed out and clearly defined in the claims at the close of this specification.

In the drawings, Figure 1 is a view in elevation, partly in section, of a portion of a milling machine, having attached thereto one form of a device embodying the invention.

Fig. 2 is a plan view of a portion of the top of the milling machine and the attachment embodying the invention.

Referring now to the drawings, 1 is a platen of a milling machine, partly broken away, the lower portion of the machine being omitted. A milling cutter 2 is mounted on an arbor 3 which is journaled in the column or arbor support 4. The arbor 3 is driven by any suitable mechanism. A horizontal arm 5 is mounted on the upper part of the arbor support 4, and mounted on said arm 5 is a yoke or hanger in which is journaled a rotary brush 6. In the form of device shown in the drawings, the hanger in which the brush 6 is journaled comprises two depending arms 7 parallel with each other which are respectively provided at their upper ends with straps 8 which encircle the arm 5, each of said straps being split transversely so that the strap may be spread open somewhat to permit its adjustment on the arm 5. Each strap has a boss 31 on the outer periphery near one end, which is connected with the boss on the corresponding end of the other strap by a tie rod 9, and the other ends of the two straps are connected together by a tie rod 10 which is journaled in the two bosses 12, 12 on the outer periphery of the two straps near the said other ends. The two tie rods are connected together by links 11, 11. An eccentric 13 is carried by the rod 10 at each end thereof. The rod 10 is provided with a lever arm 14 whereby said arm may be rotated. By rotating the said rod 10 the eccentrics 13, 13 are rotated in a manner to close or open the straps 8, 8 according to the direction of rotation of the eccentric, thereby causing the straps to grip or loosen their hold as the case may be on the arm 5. The straps are loosened for the purpose of permitting adjustment of the hanger on the arm 5 and are tightened again to clamp the hanger in its adjusted position. When the straps are loosened the hanger may be turned on the arm so as to swing the brush up out of contact with the cutter, as shown in dotted lines in Fig. 1, and the straps may then be tightened to hold the brush in the said inoperative position.

The brush 6 is preferably a bristle brush of cylindrical form, the tufts of the bristles being set into a cylindrical head 15 which is mounted fast on a shaft 16. The bristles are preferably short and stiff. Said shaft 16 is journaled in the depending arms 7 of the hanger.

By properly adjusting the hanger radially on the arm 5 the brush may be positioned so that the bristles will engage with the blades of the milling cutter 2 as shown in Fig. 1.

For the purpose of cleaning the blades of the cutter 2 the brush 6 should be rotated continuously when the cutter 2 is being rotated, and it is important that it should be driven in a direction so that the bristles of the brush will engage particularly with the cutting edges of the blades of the cutter, hence they should be rotated so that the travel of the blades and of the bristles of the brush will be in the same direction when they are in contact with each other, but at different speeds. It is preferable to have the brush travel faster than the cutter. Any suitable means of accomplishing this result may be employed. The means shown are as follows:

Mounted on the end of the spindle 19 which carries the cutter arbor 3 is a driving gear 17 which engages with a gear 18 mounted on the arm 5, the said two gears 17 and 18 being as one to one. Mounted fast on arm 5 is a gear 20 of smaller diameter than the gear 18. As shown in the drawings, gear 20 is formed integral with the gear 18. Said gear 20 engages with an idler 21 mounted on a stud 22 carried in one of the arms 7 and said idler engages with a gear 23 mounted on the brush shaft 16. The gears 20 and 23 are shown as proportioned three to one, so that the brush will make three revolutions while the cutter 2 makes one revolution. It will thus be seen that when the parts are adjusted as in Fig. 1, during the rotation of the milling cutter the brush will be constantly traveling at a greater rate of speed than the cutter and will be operative on the front or cutting edges of the blades of the cutter 2 and thoroughly clean the cutting edges of the blades from the chips of the metal which may be cut away from the surface of the bar which is being milled. The bristles being short and stiff and the cutter constantly turning its blades into the ends of these bristles, this causes a powerful thrust upon the particles of metal adhering to the blade so that the brush has two functions, it not only acts as a brush to wipe the particles from the blades, but it also acts as a matting tool upon the adhering particles and thrusts them away from the cutting edge. The drawing shows a bar 24 mounted on the feed block 251 in the process of being milled.

I have found that the chips or fine particles of metal which are cut from the bar which is being operated upon are less likely to adhere to the cutter, or if they do adhere to the cutter, they are more easily brushed away, if the blades of the cutter are kept oiled. Inasmuch as it is not desired to have a large amount of oil on the cutter at any time, but rather to keep the blades slightly oiled all of the time, I have found it productive of good results to keep the brush 6 oiled and to oil the blades by means of the brush 6 at the same time that the brush cleans the blades. In order to keep the brush 6 constantly oiled without dripping I provide an oiling roll which is of the same width as the brush and against which the brush will contact during its rotation.

This oiling roll is preferably a pad of felt 25 or other equivalent material mounted on the periphery of a wooden core 26. The said roll is mounted loosely on a shaft 27 so as to be rotatable thereon. Said shaft 27 is mounted fast in the arms 28 which are pivotally connected at 29 with arms 30 which project from the outer periphery of the straps 8 of the hanger which carries the brush. By reason of the pivot connection of the arms 28 with the straps 8 the oiler roll 25 will when the device is mounted as shown in Fig. 1, drop by gravity into contact with the brush roll 6.

The pad 25 is sufficiently saturated with oil so that as the brush in its rotation engages the periphery of the oil pad the bristles of the brush will be constantly reoiled.

The oil roll need not have any independent means for rotating the same but it will be caused to rotate by its frictional contact with the brush so that all portions of the periphery of the oil roll will successively be brought into operative contact with the brush.

While I have described one form of attachment for a milling machine whereby the blades of the cutter are cleaned automatically during the rotation of the cutter, I do not intend to limit the claims to the particular form of mechanism shown, said mechanism being illustrative of one form of means for cleaning the blades. My invention resides broadly in the idea of automatically cleaning the cutting edges of the blades during the movement of the cutter after each operative contact of a blade before it again comes into operative engagement with the metal which is being milled, or in other words, it resides broadly in the method of cutting down the surface of a metal plate in such manner as to constantly leave a smooth surface where it is milled down, said method consisting of removing the metal from the surface by a cutter and cleaning the cutting edge of each blade automatically each time after it leaves the metal before it again comes into contact with the metal.

What I claim is:

1. In combination with a milling machine having a rotary cutter, a rotary bristle brush whose axis extends parallel with the axis of the cutter, a yoke in which said brush is journaled, a supporting shaft parallel with the axis of said brush, means for adjustably securing said yoke to said shaft to maintain the brush parallel with the axis of the cutter, the yoke being adjustable to change the position of the brush toward and away from the cutter, and means for maintaining the yoke in its adjusted position, so that the brush may be maintained either in engagement with the cutter or entirely free from the cutter, as desired.

2. In combination with a milling machine having a rotary cutter, a rotary brush whose axis is parallel with the axis of the cutter, a mount in which said brush is journaled, so located that the brush engages with the cutter during the rotation, and a rotary oiling roll which engages with the periphery of the brush throughout the length of the brush, and bears with a pressure on said brush.

3. In combination with a milling machine having a rotary milling cutter, a rotary brush whose axis extends parallel with the axis of the cutter, and means for supporting said brush in relation to the said cutter, said supporting means comprising a shaft which extends parallel with the axis of the brush and of the cutter, a strap adjustably secured to said shaft, an arm projecting from said strap and having bearings in which said brush is journaled, said strap being adjustable on said shaft whereby the bearing for the brush is radially adjustable to vary the position of the brush with relation to the cutter.

4. In combination with a milling machine having a rotary milling cutter, a rotary brush whose axis extends parallel with the axis of the cutter, and means for supporting said brush in relation to the said cutter, said supporting means comprising a shaft which extends parallel with the axis of the brush and of the cutter, a strap adjustably secured to said shaft, an arm projecting from said strap and having bearings in which said brush is journaled, said strap being adjustable on said shaft whereby the bearing for the brush is radially adjustable to vary the position of the brush with relation to the cutter, an oiling roll and an arm projecting from said strap with which said oiling roll is pivotally connected in such manner that the oiling roll bears upon the periphery of said brush.

5. In combination with a milling machine having a rotary milling cutter, a rotary brush located in position to engage the blades of the cutter during the rotation, and an adjustable mount for the brush, said mount being adjustable to bring the brush into position to engage the blades of the cutter and to shift the brush out of engaging position, and means for maintaining the mount with the brush in the adjusted position, either in engagement with the cutter or entirely free from engaging position with the cutter, as desired.

6. In combination with a machine having a rotary milling cutter, a rotary brush, means for holding the brush so that it may at will be located in position to engage the blades of the cutter during the rotation or in a position where it will be out of engagement with the cutter, and means for maintaining the brush in the adjusted position, either in engaging position with the cutter or entirely out of engaging position as desired.

7. In combination with a milling machine having a rotary milling cutter, a brush which extends alongside of the cutter its full length, means for holding the brush in a position to engage the blades of the cutter during the rotation, means for rotating both the brush and the cutter, and a rotary oiling member which engages with the brush throughout the entire length of the brush and thereby applies oil to the brush as the brush and oiling member rotate in engagement with each other.

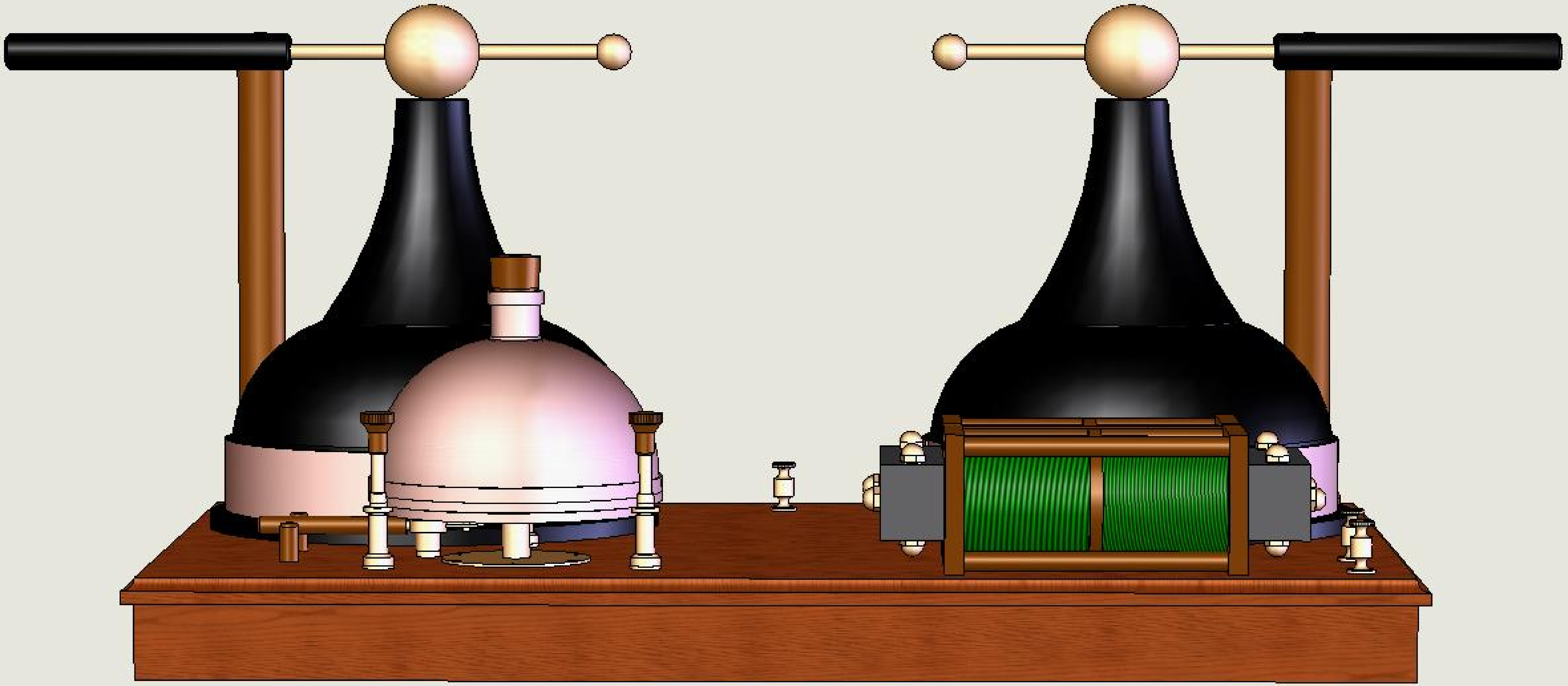
8. In combination with a milling machine having a rotary milling cutter, a rotary bristle brush, means for holding the brush in a position to engage the blades of the cutter during the rotation, means for rotat-

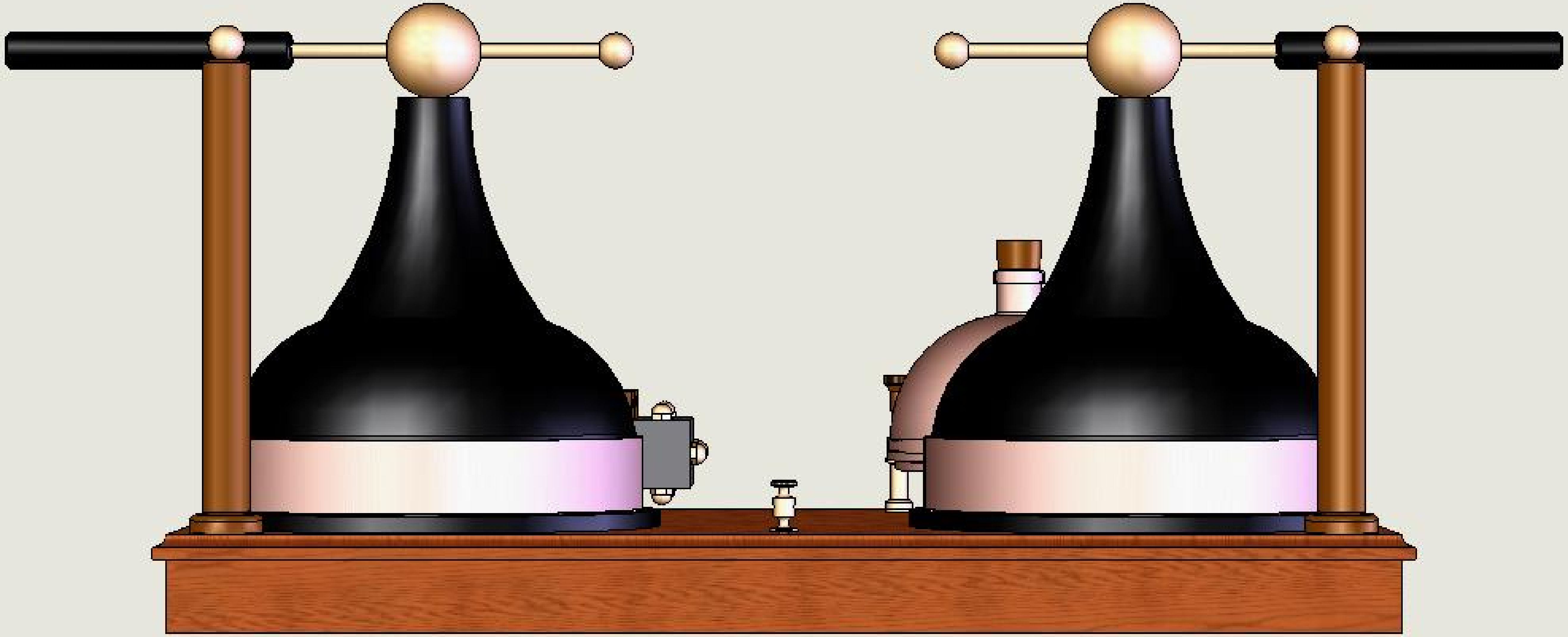
ing the cutter and the brush, and means for automatically applying oil to the said brush during the rotation.

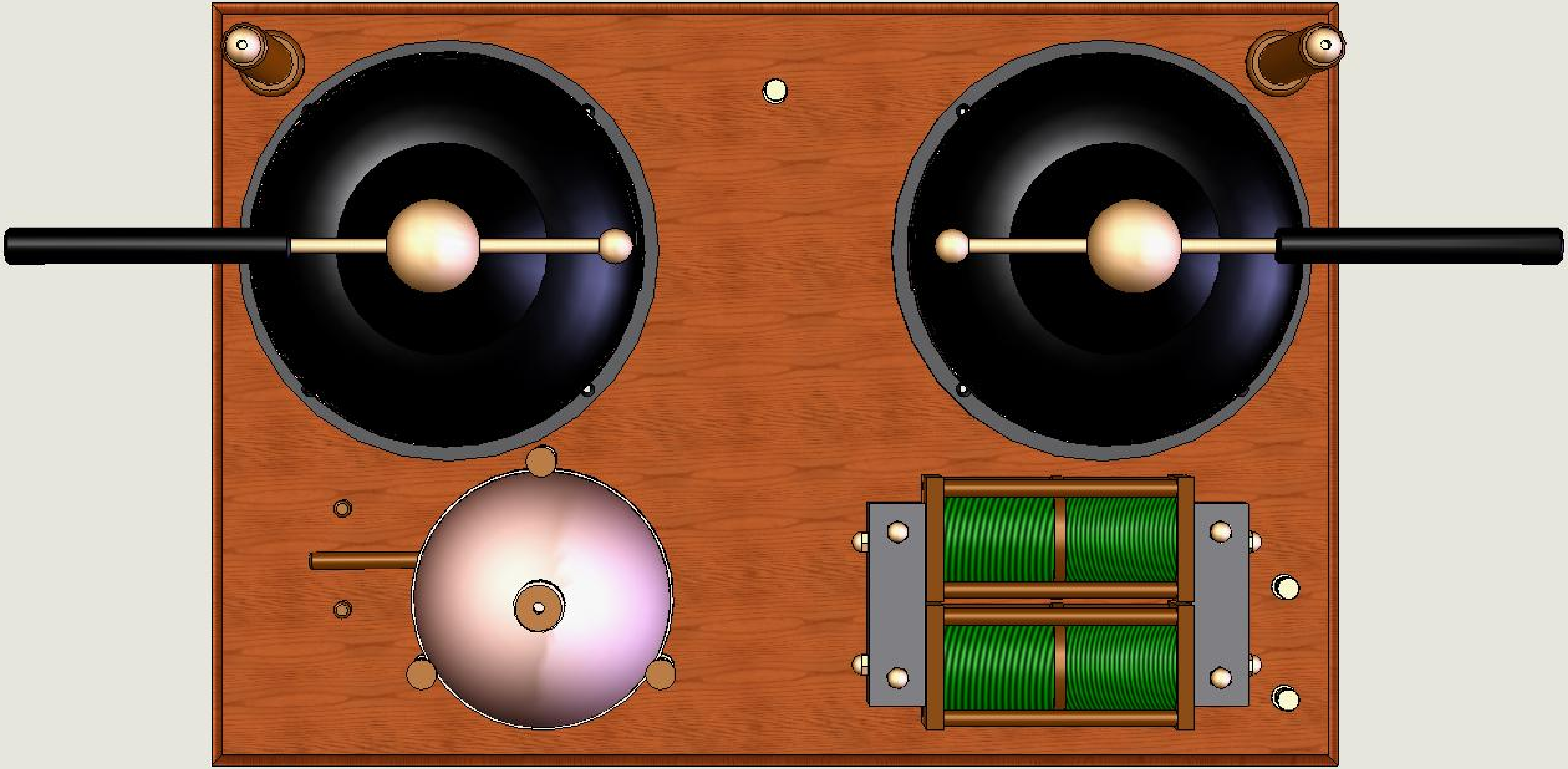
9. In combination with a milling machine having a rotary cutter, a rotary bristle brush, means for holding the brush in a position to engage the blades of the cutter during the rotation, means for rotating the cutter and the brush, a second rotary member located in position to engage said bristle brush, said second rotary member being provided with an oil pad on its periphery whereby it maintains the ends of the bristles of said first brush in an oily state.

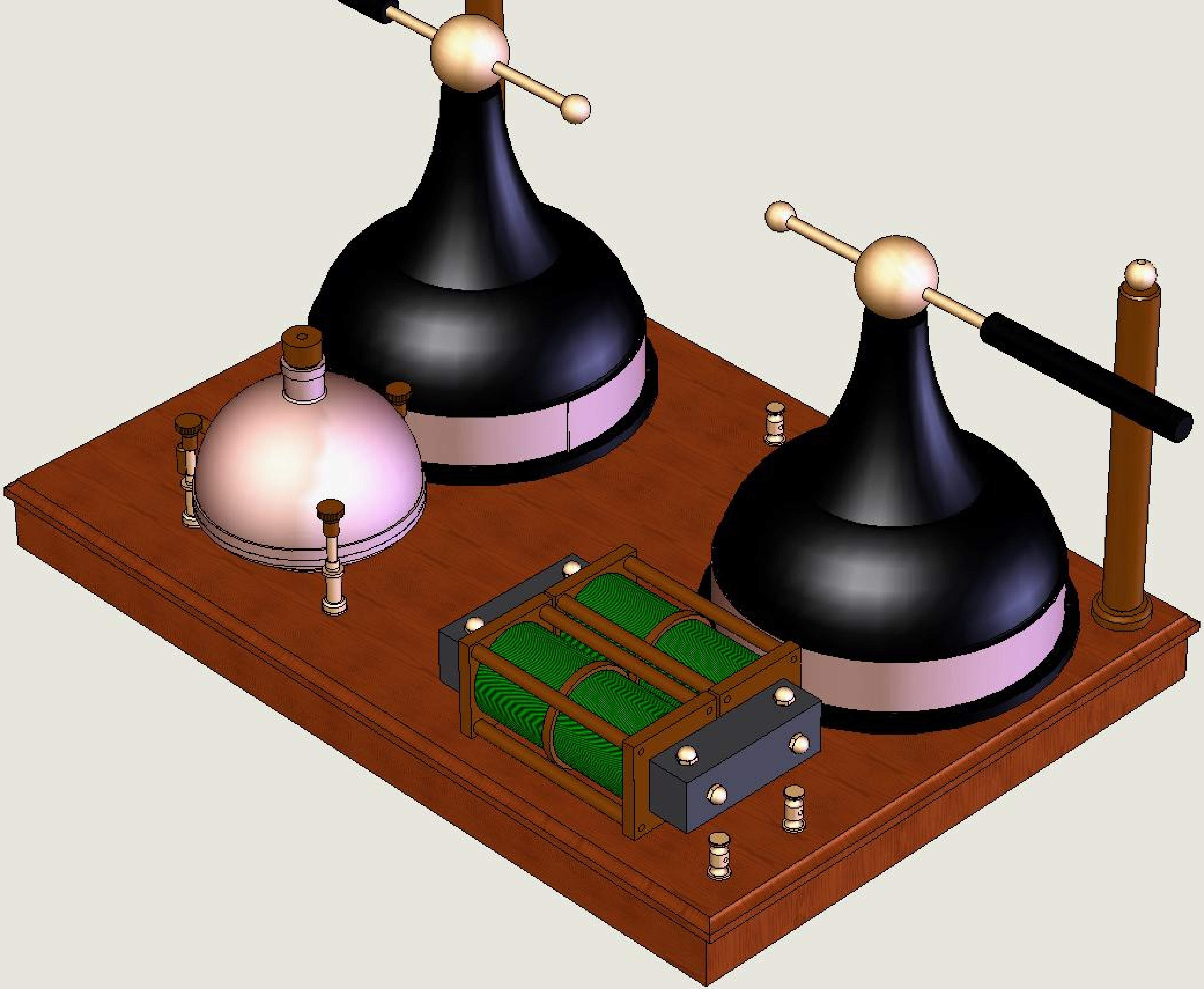
In testimony whereof I affix my signature.

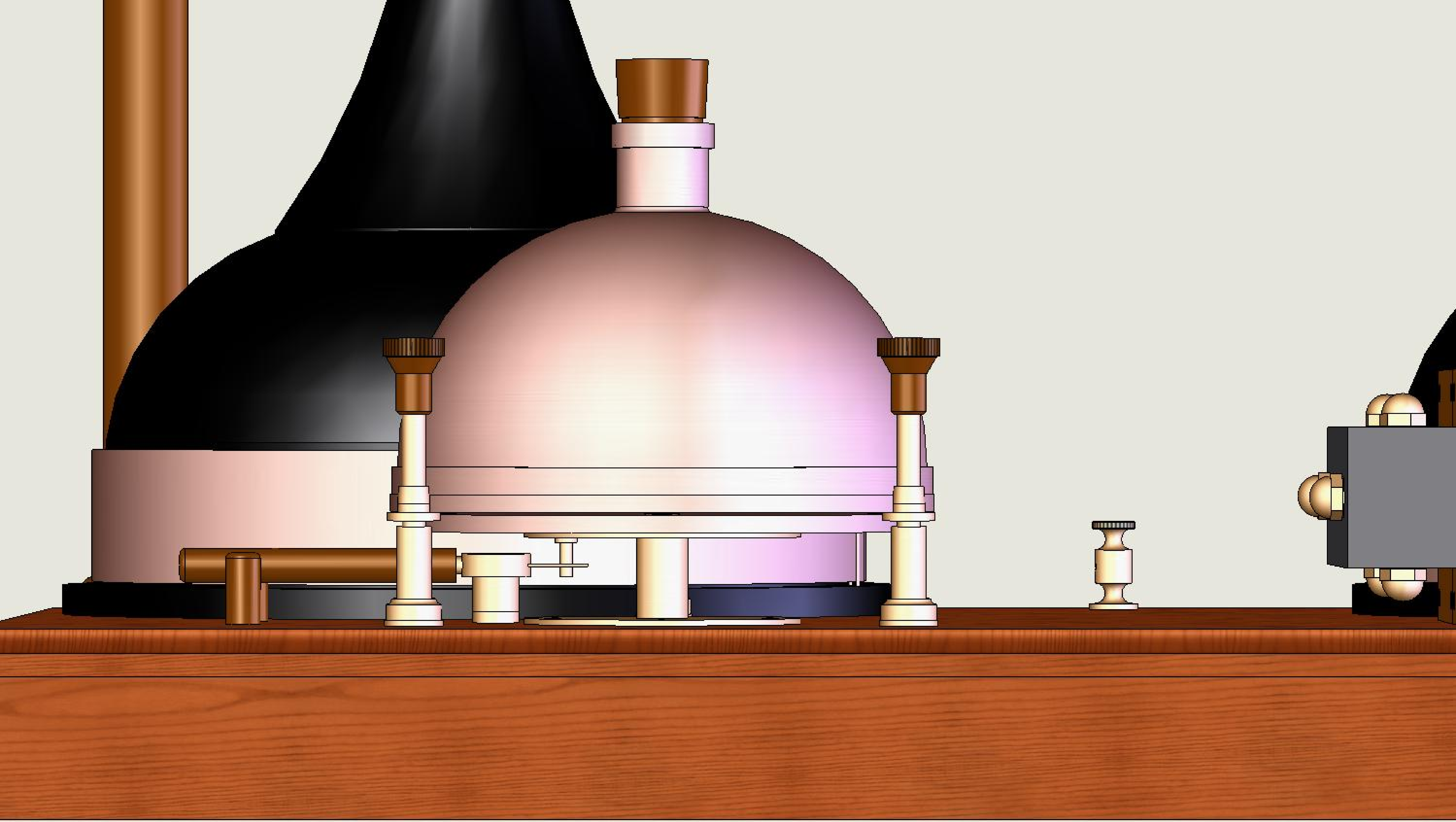
THOMAS B. KINRAIDE.

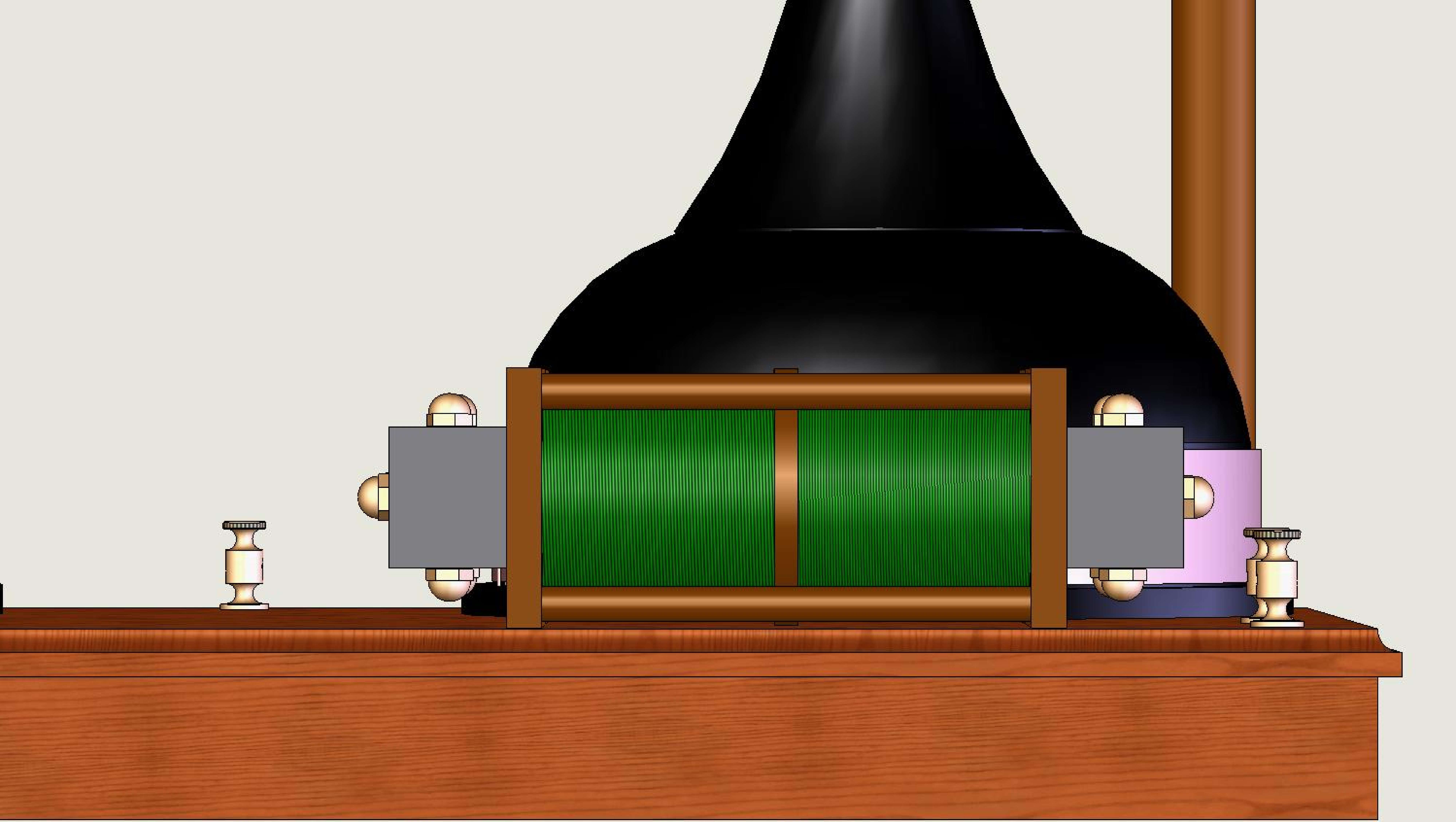


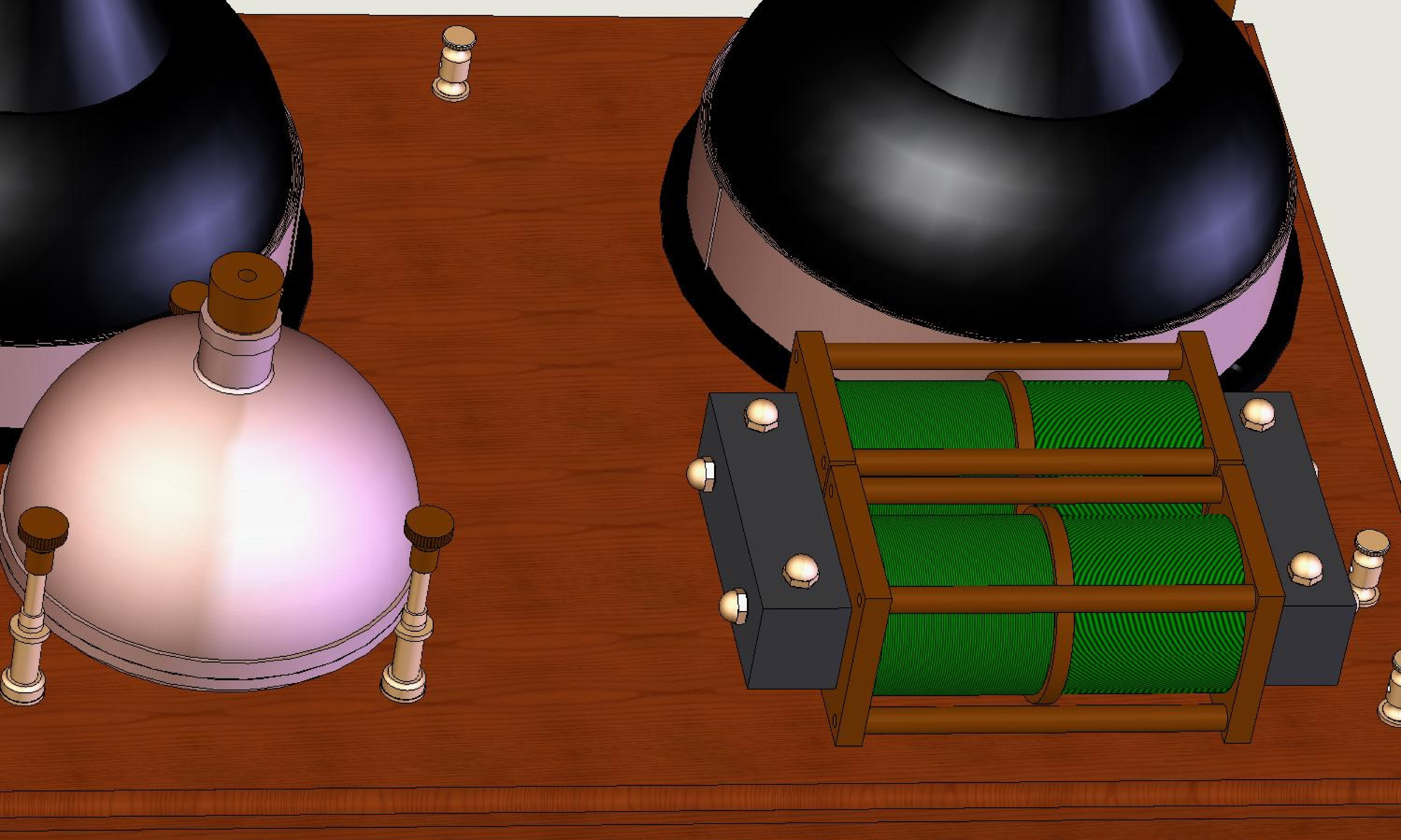


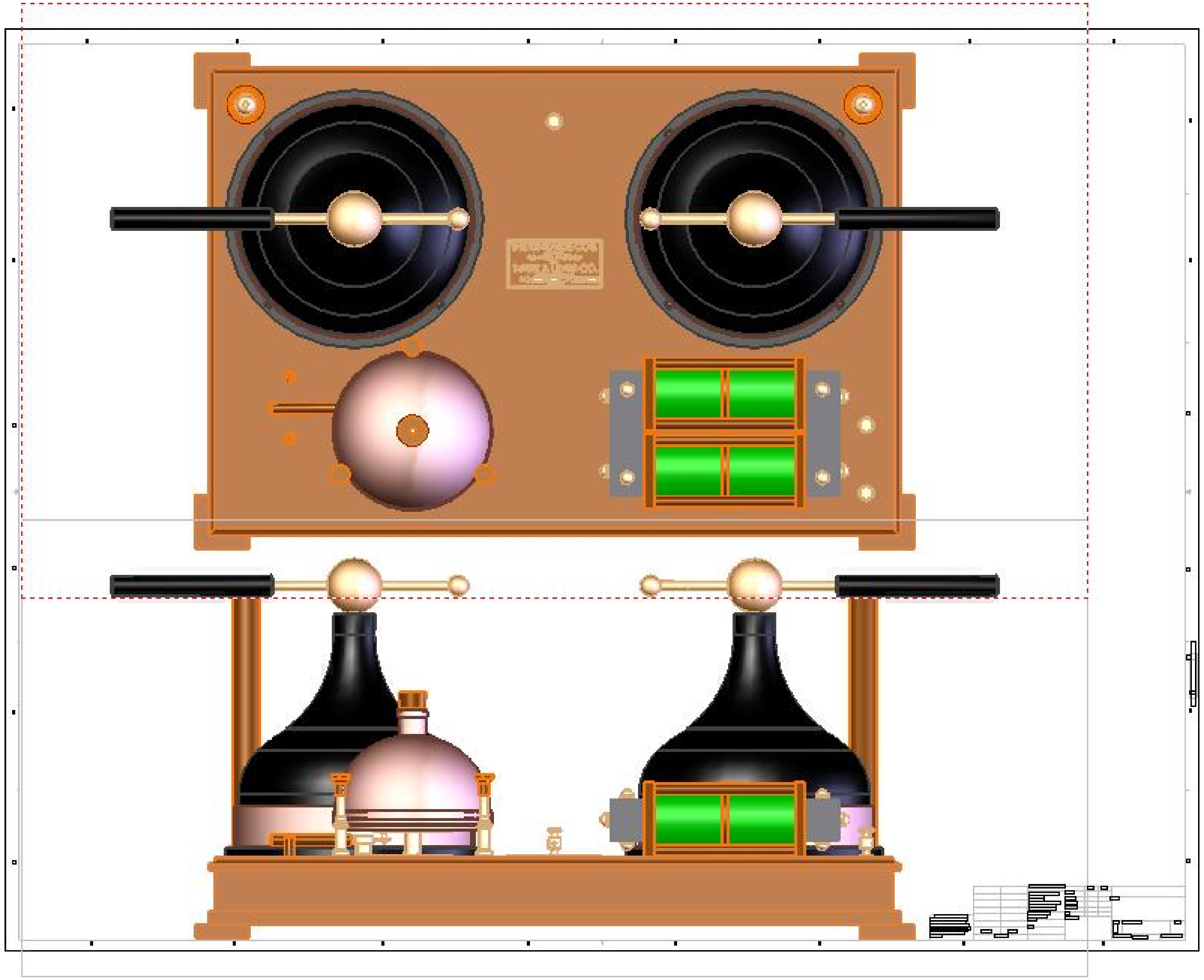


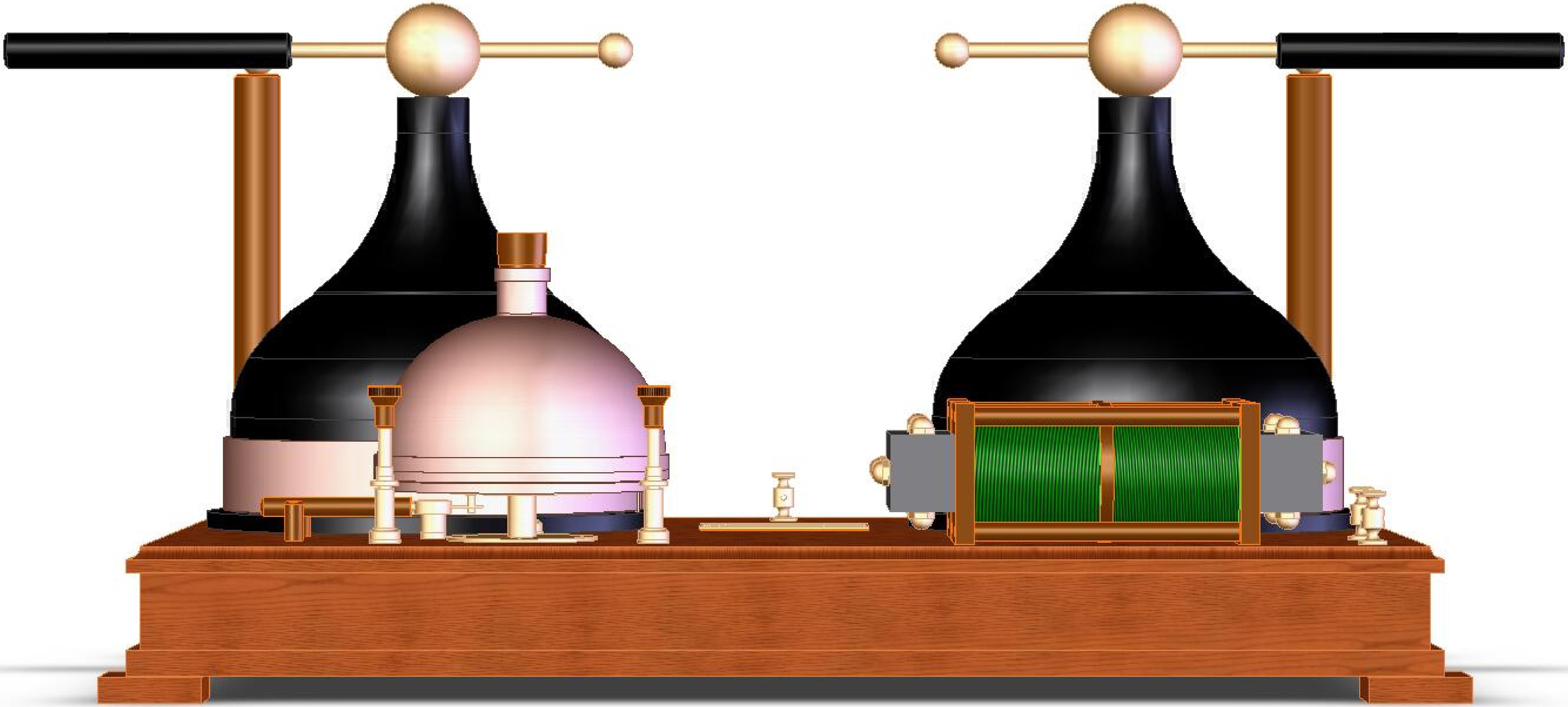


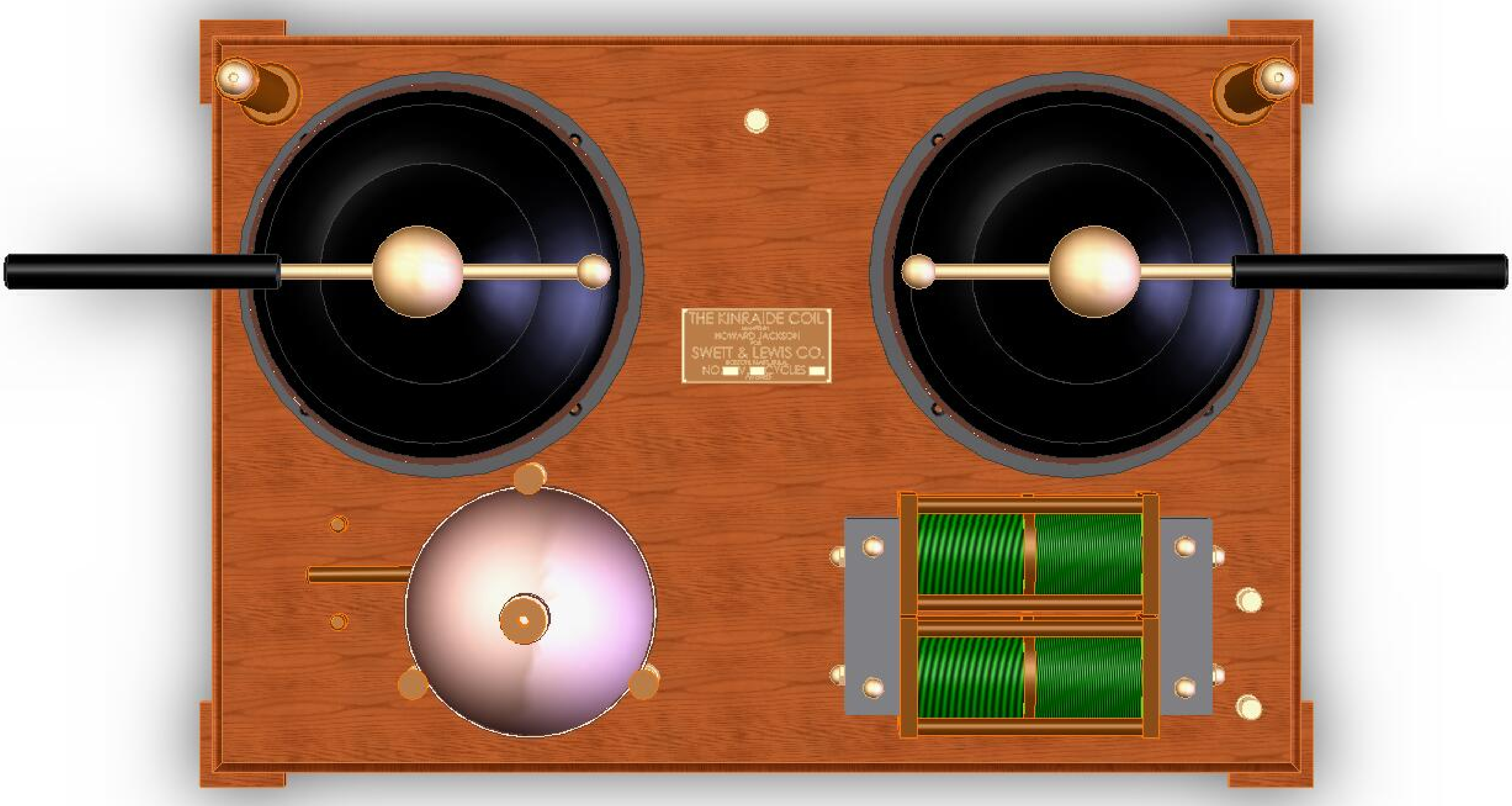








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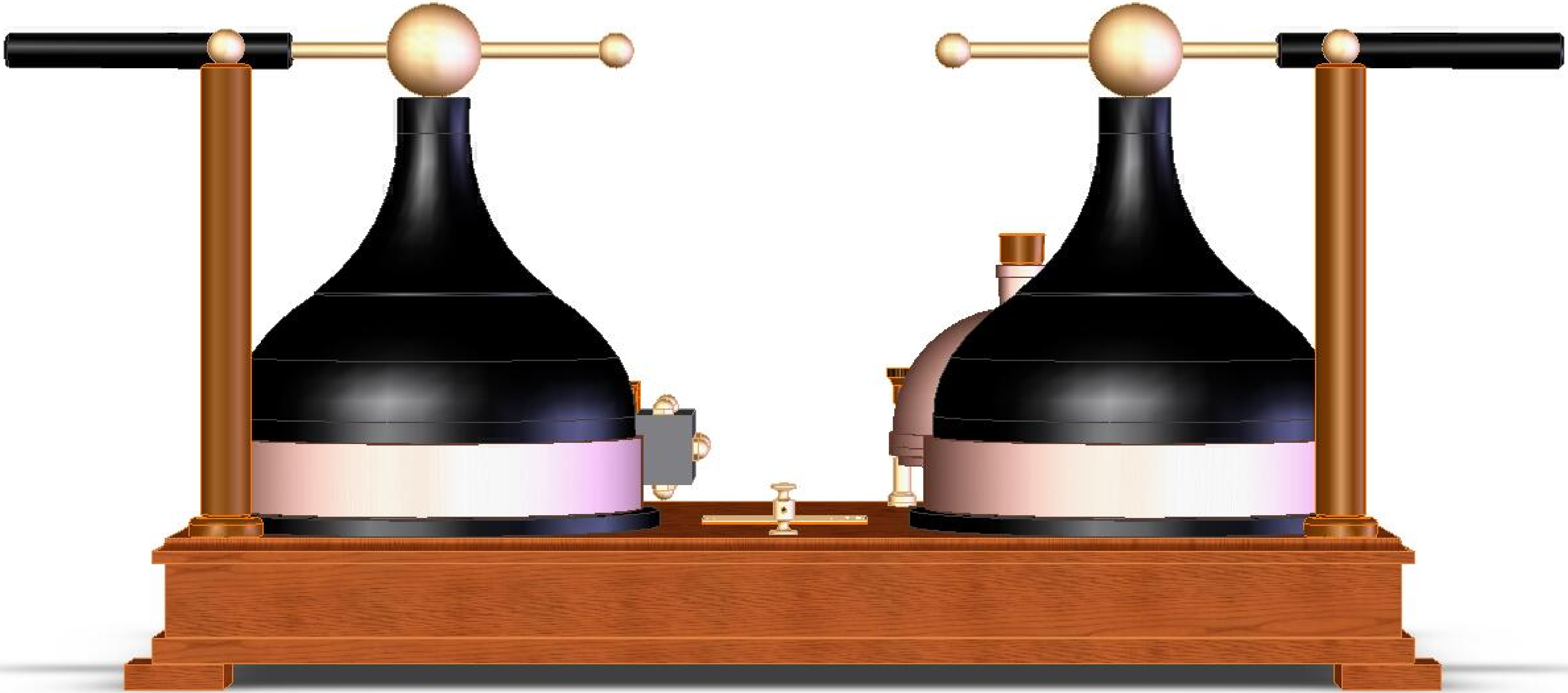

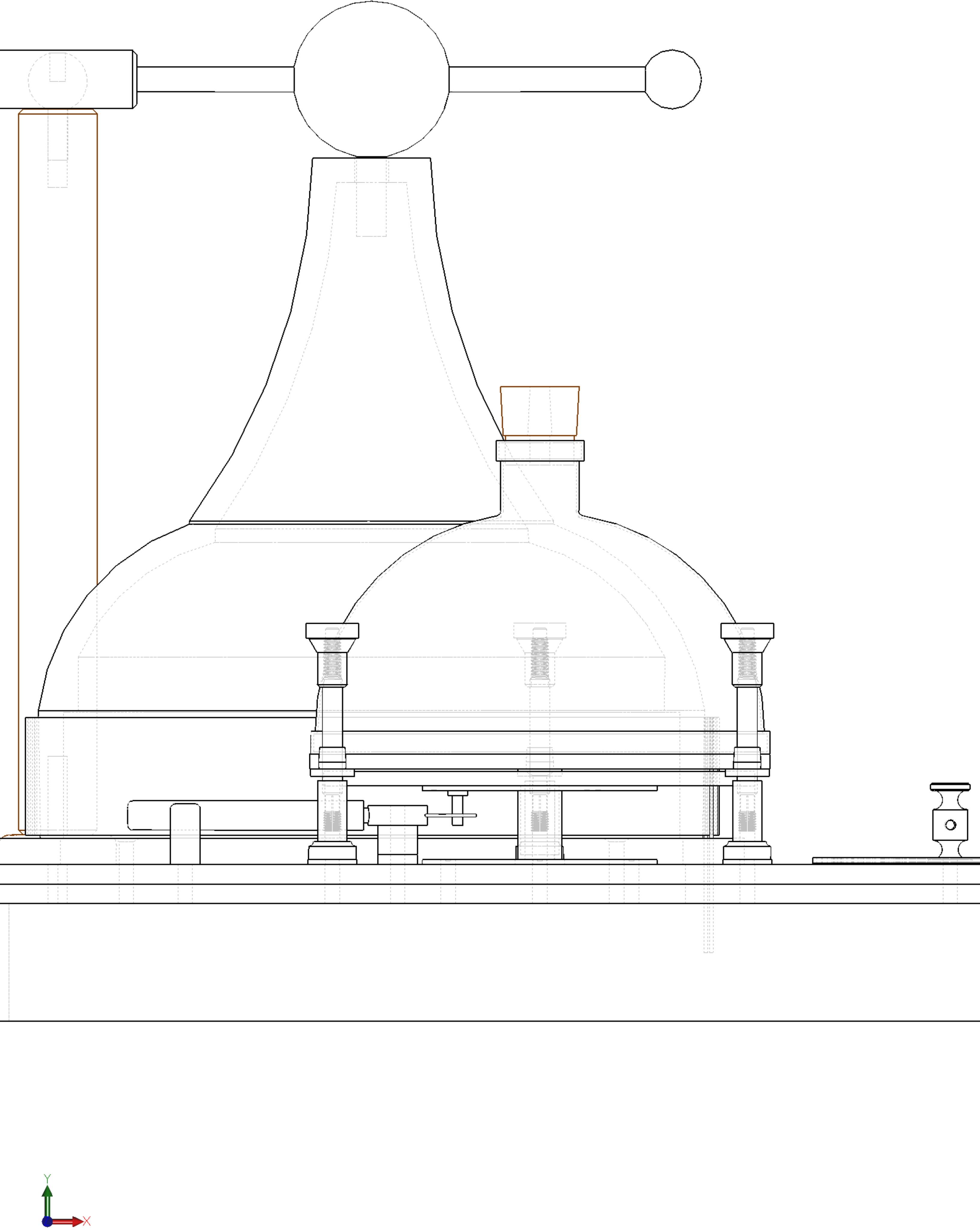
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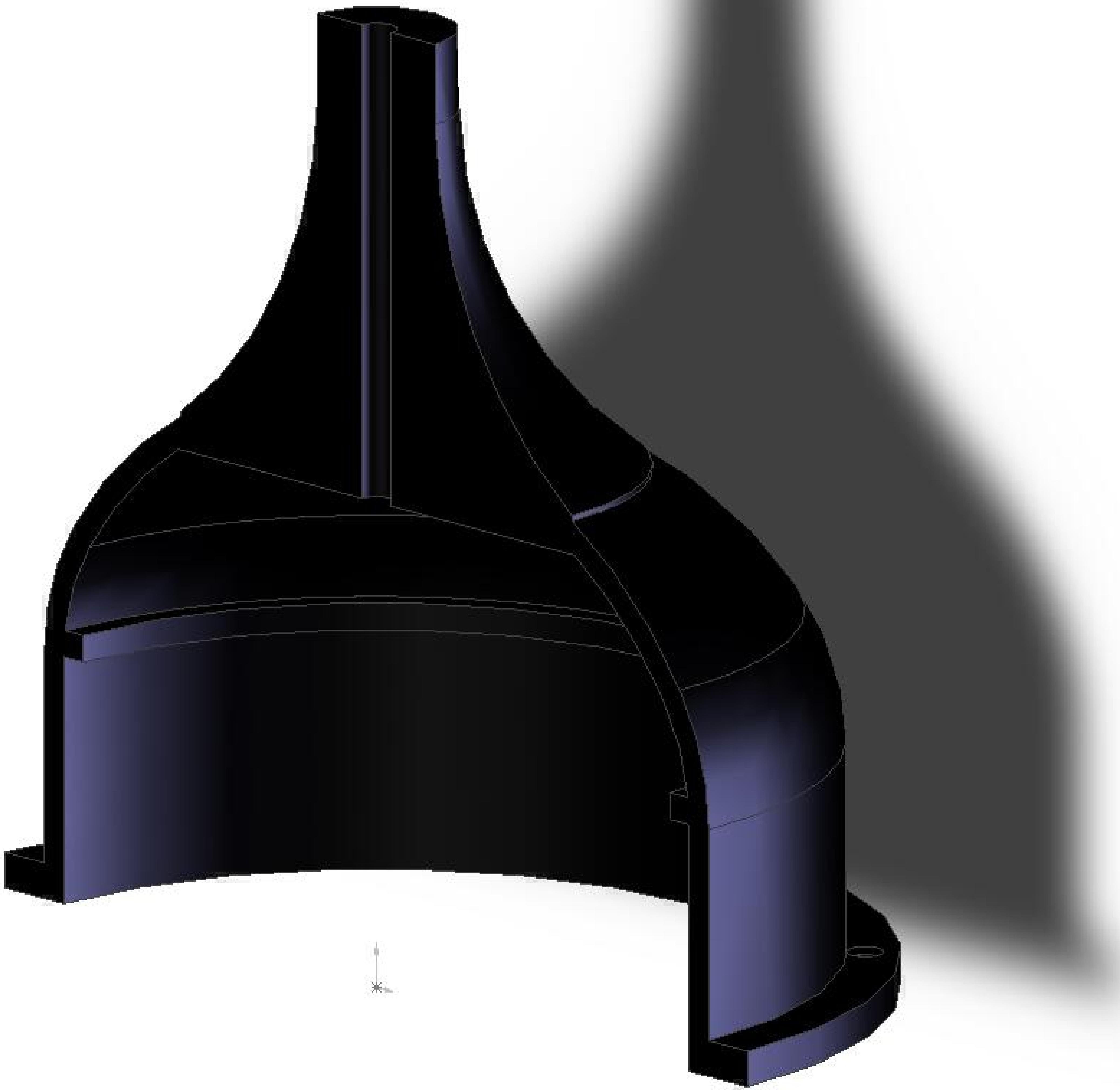

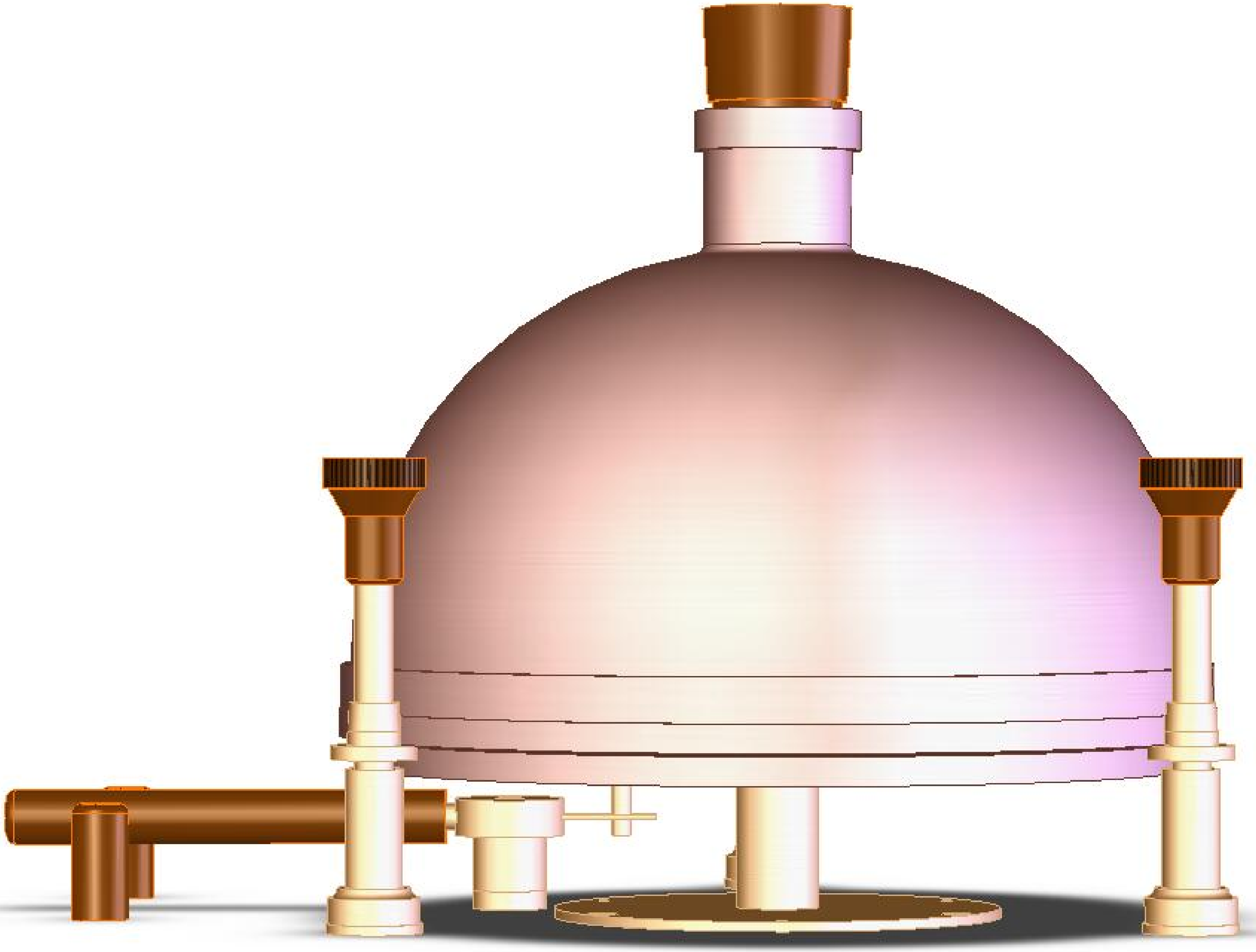

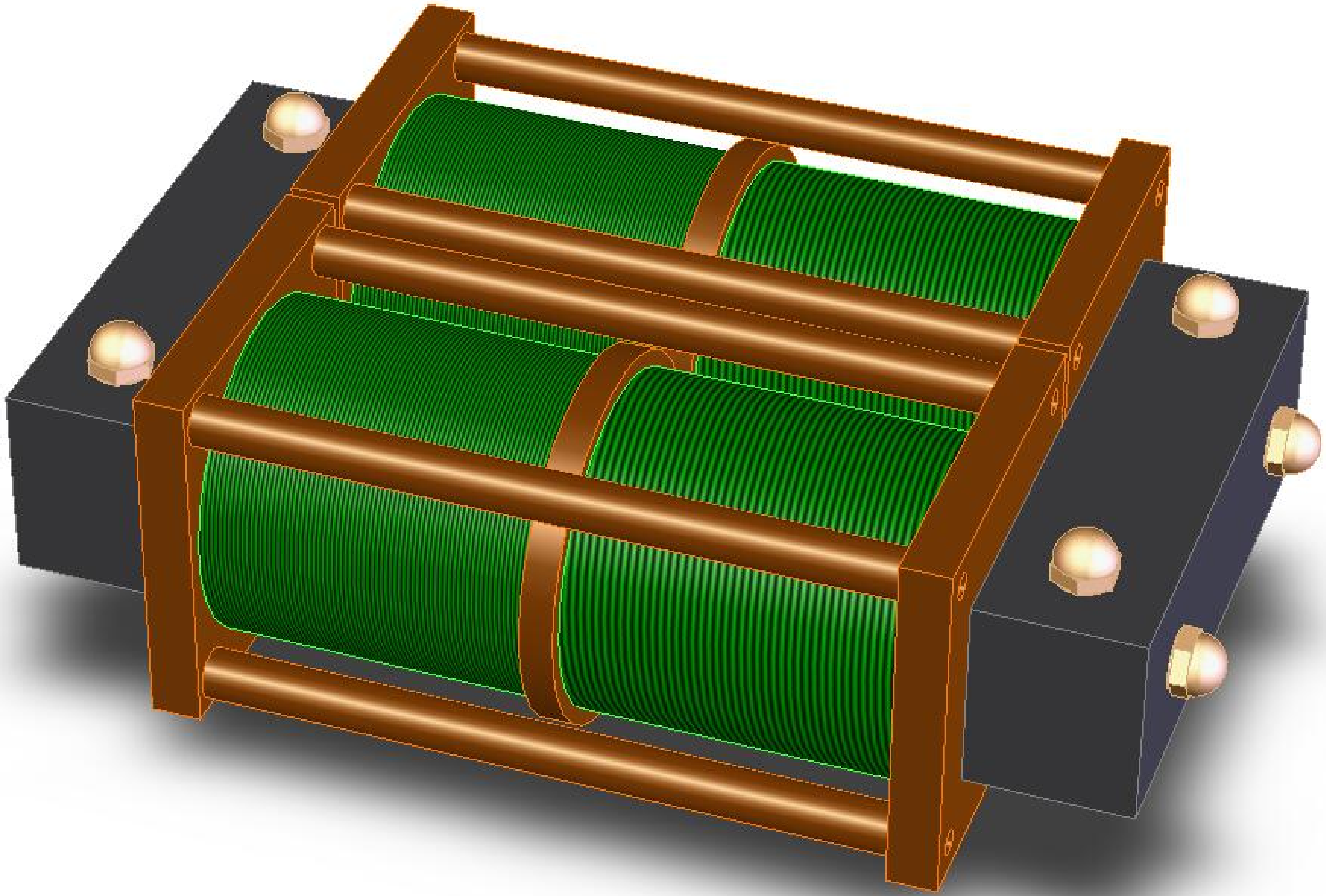

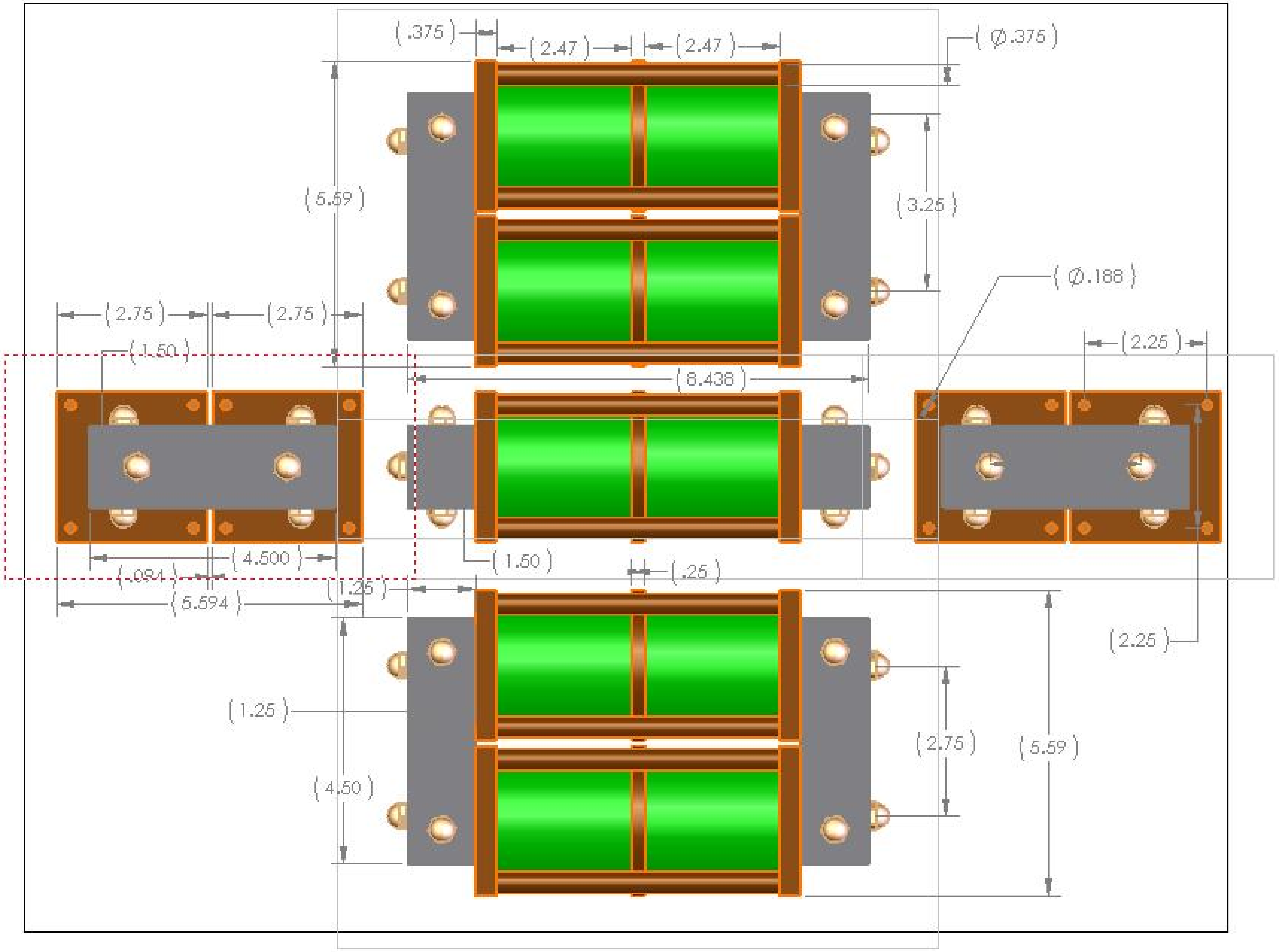
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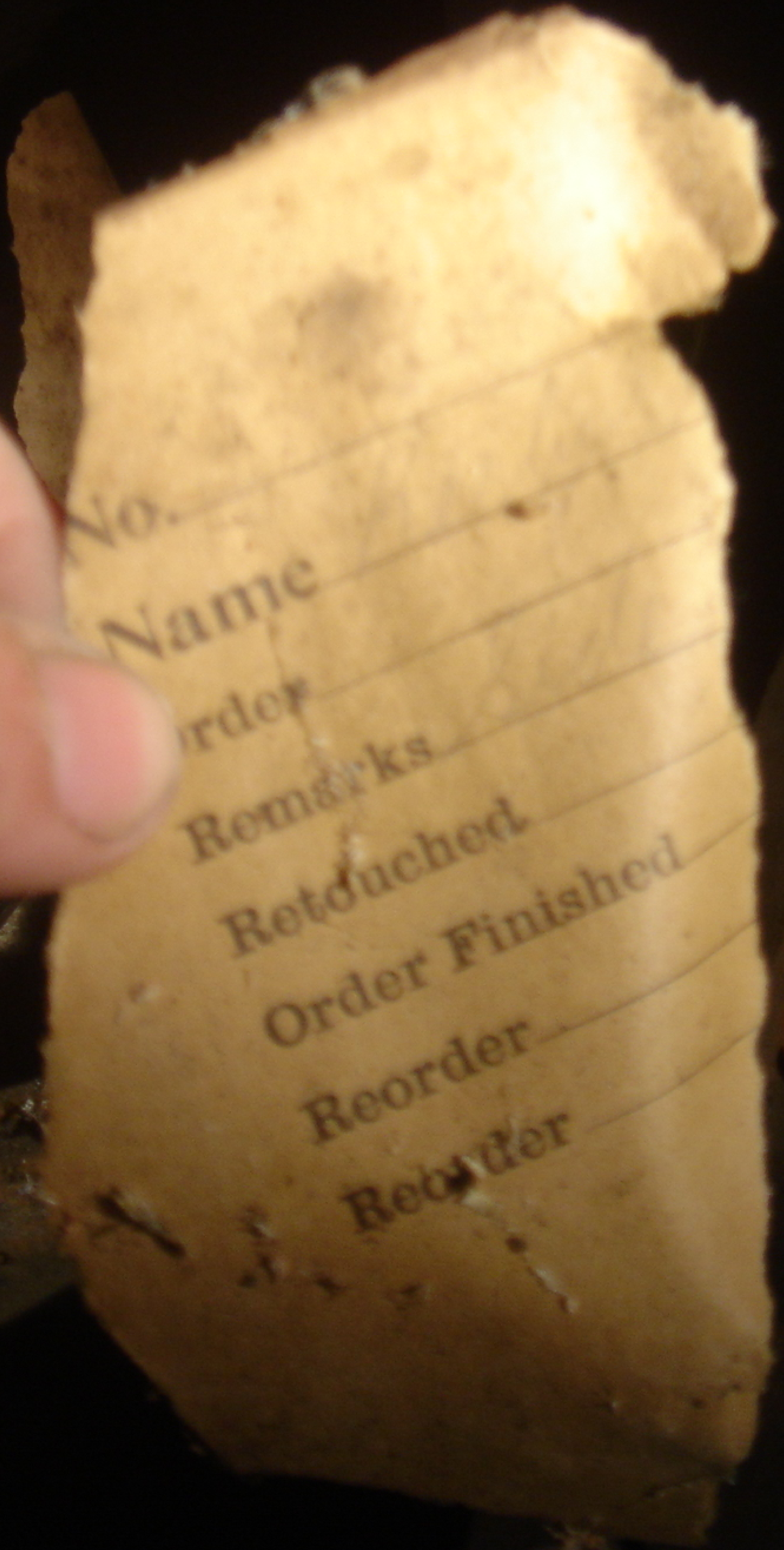

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JEFF BEHARY

IN QUEST OF KINRAIDE

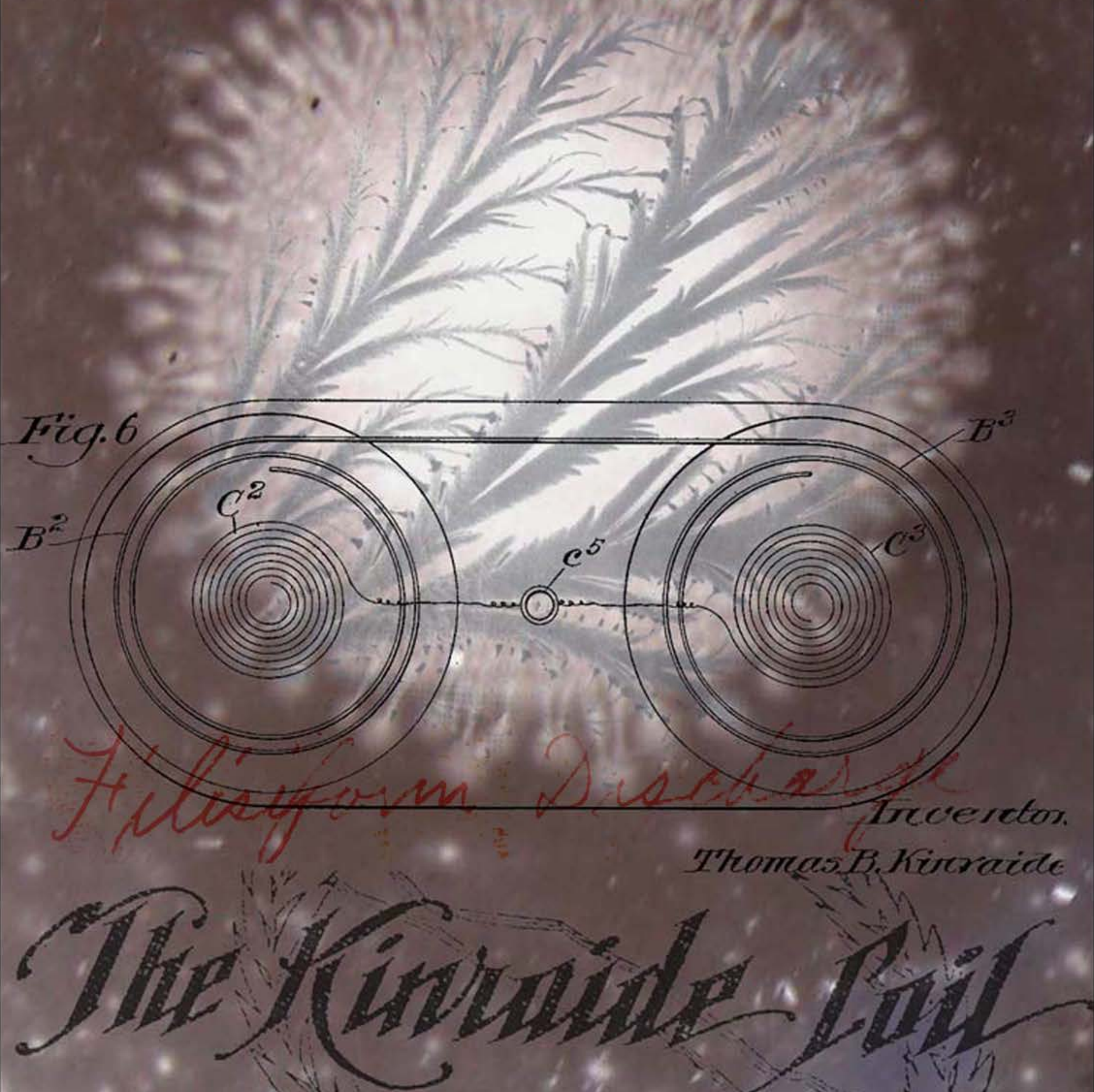
Fig. 6
B3
C2
B2
C5
C3
Filiform Discharge
Inventor.
Thomas B. Kinraide
The Kinraide Coil

GROUND
THE KINRAIDE COIL
MADE BY
HOWARD JACKSON
FOR
SWETT & LEWIS CO.
BOSTON, MASS. U.S.A.
V. 104 CYCLES 60
PATENTED

THE KINRAIDE COIL
MANF'D BY
HOWARD JACKSON
FOR
SWETT & LEWIS CO.
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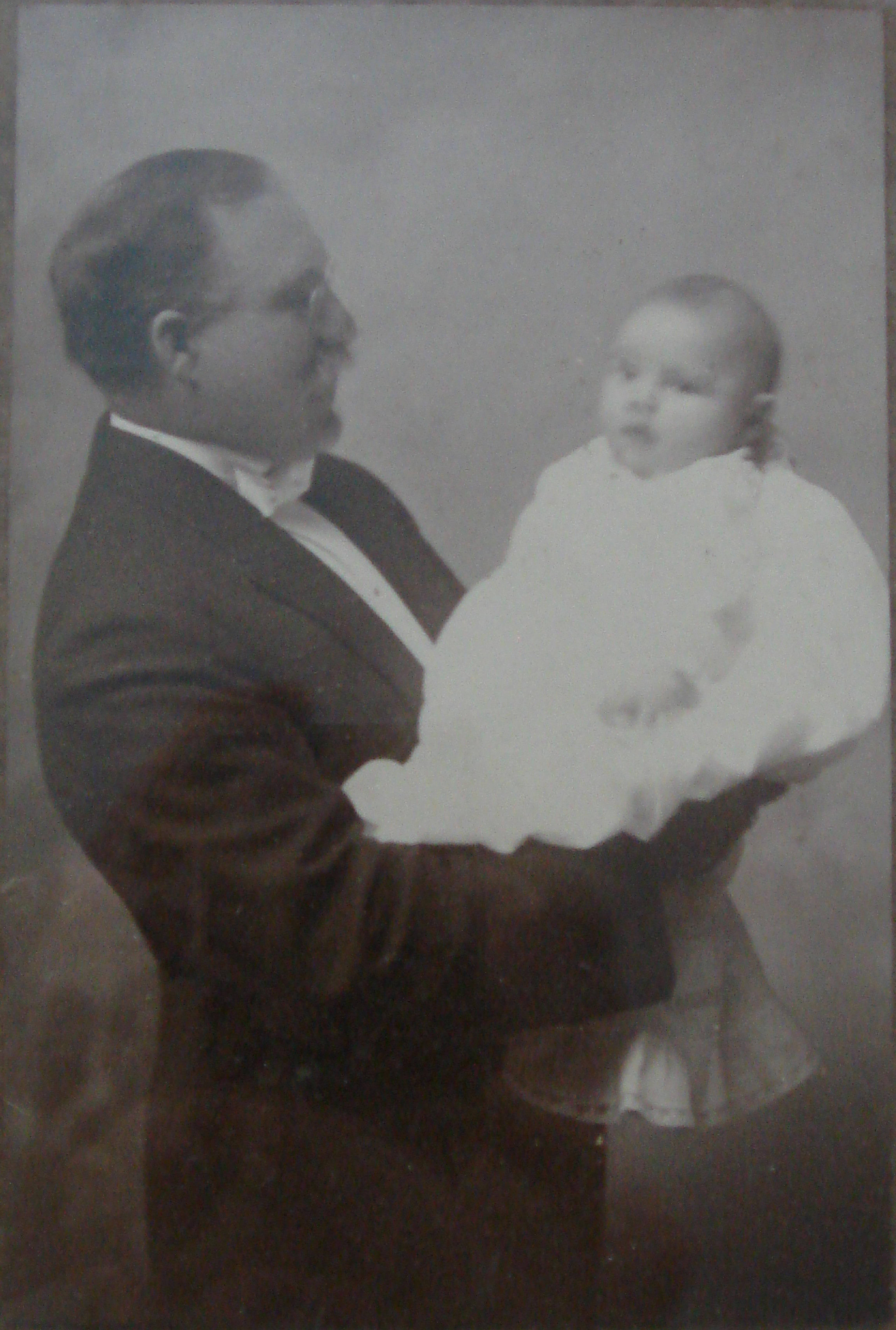

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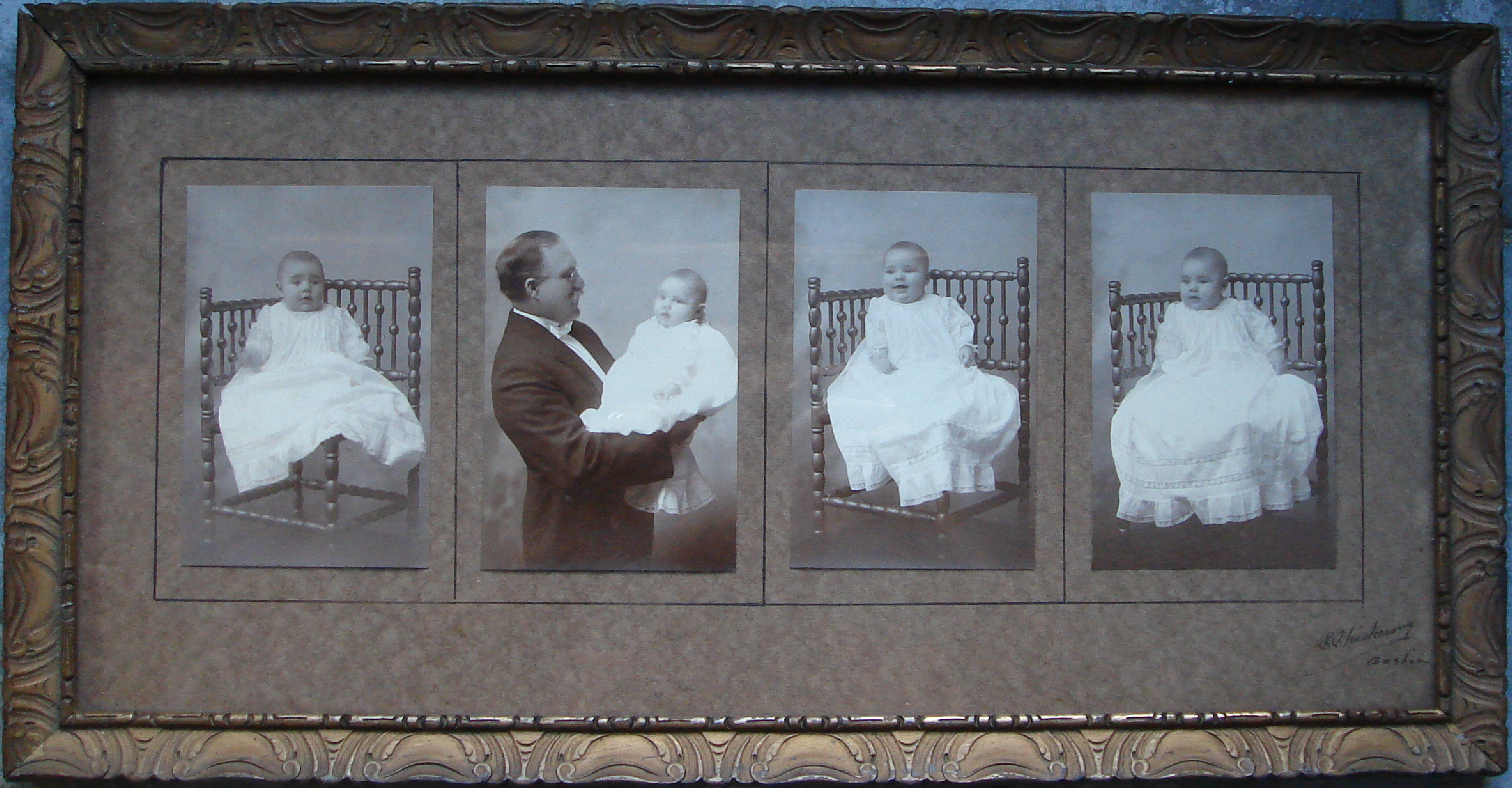

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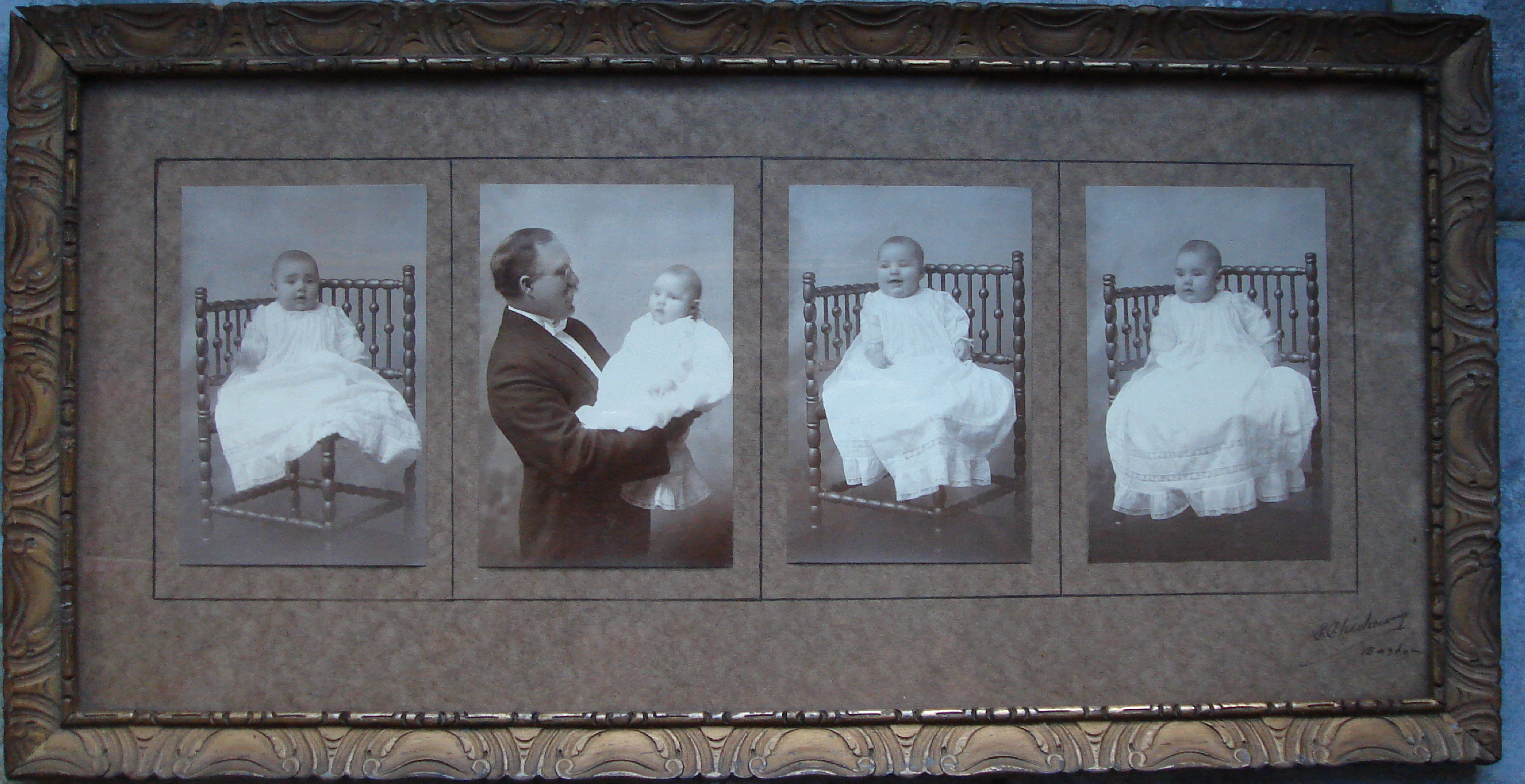
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Set No. 3501 Adjusted to True Ohms at 20.0 °C. Re-Adjustment Completed 9-30 1901 by A.J.S.

The values of the Rheostat Coils are accurate to 1/5 of 1 per cent. The values of the Bridge Coils are accurate to 1/10 of 1 per cent. For every 9.0 °C above or below 20.0 °C the coils of this set will increase or decrease in resistance 1/5 of 1 per cent. This being the normal range of working temperatue, the highest accuracy of the set is ordinarily obtained without correction.

ELECTRICAL LABORATORY,
QUEEN & CO., Incorporated,
Per A.J.S.

1 B. A. ohm=0.98 6 ohms.
1 ohm=1.0135 B. A. ohms.
1 Legal ohm=0.99718 ohms.
1 ohm=1.00283 Legal ohms.

Blocks A, B, and the two adjoining are connected to Bridge Arms A and B and Rheostat and Line respectively. Unless the Bridge Arms are to be of equal value, always have the most resistance out in arm B. When the commutator plugs have the direction indicated by fig. 1, the set is arranged for measuring high resistance. Then $X=R\frac{B}{A}$. When the plugs have the position shown by fig. 2, the set is arranged for measuring low resistance. Then $X=R\frac{A}{B}$. The needle swinging to + means too large a resistance in Rheostat. Swinging to — means too small a resistance.—To connect in an outside battery, remove the terminal cords from the battery tips and connect the outside battery, with positive terminal to + battery post and negative terminal to — battery post.—To connect Golvanometer, Battery, and Rheostat in series with outside resistance, join terminals of latter to — battery post and top line post respectively, and remove the commutator plugs.—To use Galvonometer separately, remove all plugs from commutator.

MOST SUITABLE VALUE FOR BRIDGE ARMS.

If unknown resistance is below	1.5		ohms, make	A=1	B=1000	Fig. 2.
Between	1.5 and	11	" "	A=1	B=100	
"	11.0 "	78	" "	A=10	B=100	
"	78.0 "	1,100	" "	A=100	B=1000	
"	1,100.0 "	6,100	" "	A=100	B=100	—Fig. 1 or 2.
"	6,100.0 "	110,000	" "	B=1000	A=100	Fig. 1.
"	110,000.0 "	1,110,000	" "	B=1000	A=10	
Above	1,110,000.0		" "	B=1000	A=1	

Fig. 1.

Fig 2

Early version of a
an Wheatstone Bridge
Used for measuring resistance
in an electric wire.
Belonged to Grandfather Kinraide.
Not any good per
Bob Kinraide

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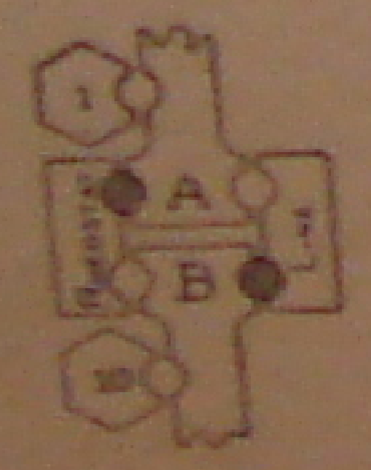

Fig. 1.

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"	78.0	"	1,100	" "	A=100	B=1000	
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"	110,000.0	"	1,110,000	" "	B=1000	A=10	
Above	1,110,000.0			" "	B=1000	A=1	

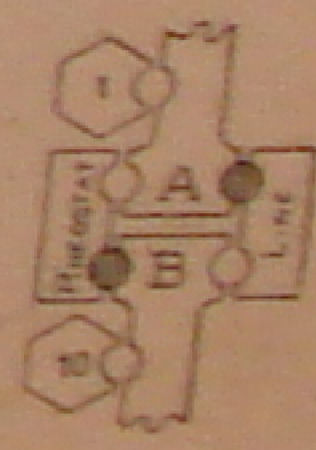

Fig 2

Early version of a
an Wheatstone Bridge

position shown by fig. 2, the set is arranged for measuring low resistance. Then $X=R\frac{A}{B}$. The needle swinging to + means too large a resistance in Rheostat. Swinging to — means too small a resistance.—To connect in an outside battery, remove the terminal cords from the battery tips and connect the outside battery, with positive terminal to + battery post and negative terminal to — battery post.—To connect Golvanometer, Battery, and Rheostat in series with outside resistance, join terminals of latter to — battery post and top line post respectively, and remove the commutator plugs.—To use Galvonometer separately, remove all plugs from commutator.

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"	6,100.0 "	110,000	" " B=1000	A=100	Fig. 1.
"	110,000.0 "	1,110,000	" " B=1000	A=10	
Above	1,110,000.0		" " B=1000	A=1	

Fig. 1.

Fig 2

Rubicon	Queens
~~9.5~~	6.5
9.75	6.1
9.55	

.54 micro/mm	Div
	3.4 ?
20.5	3.5
25.8	3.8
22.0	3.1
20.0	3.2
20.0	3.3
21.0	3.4
20.0	
	3.4

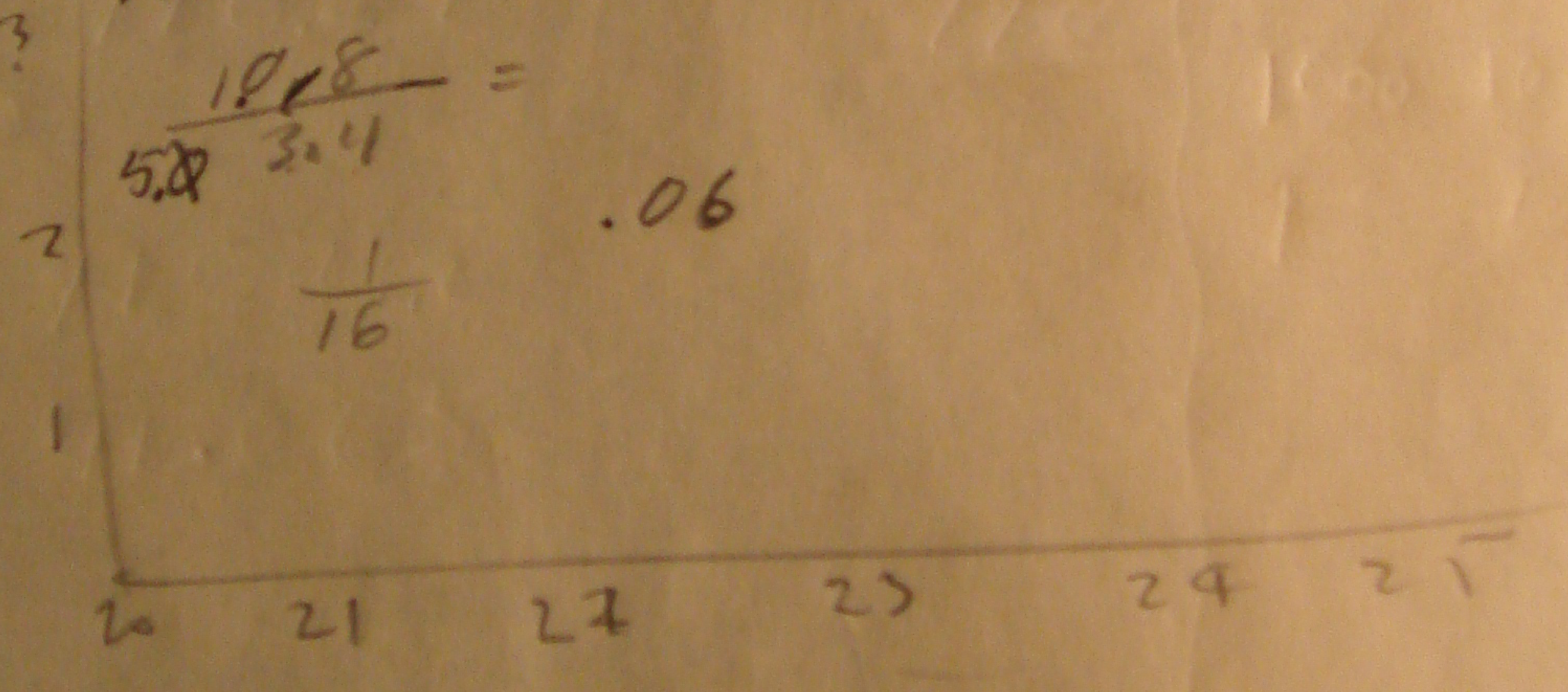
×10.8 =

?

$\frac{10.8}{3.4} =$ 5.0

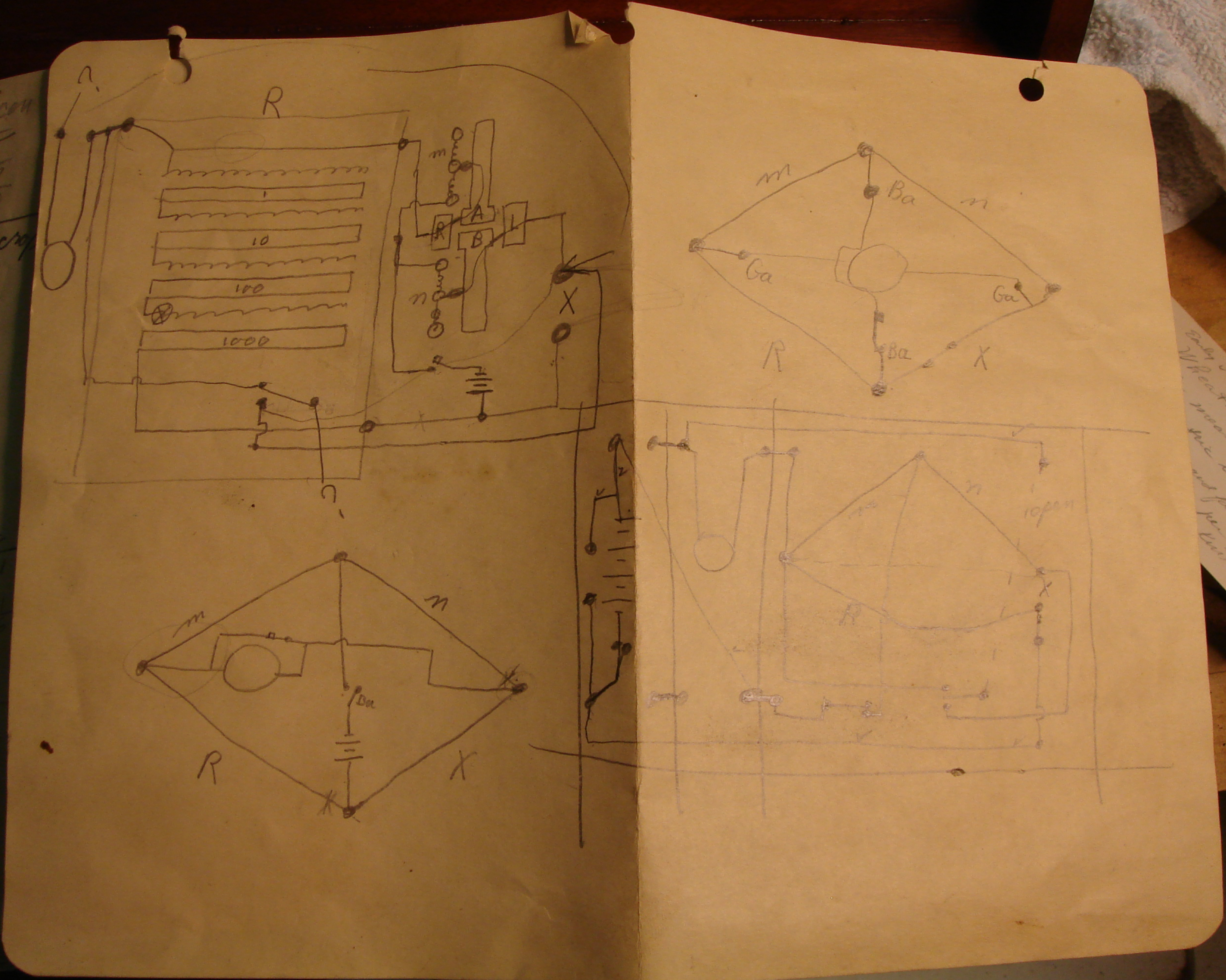
.06

$\frac{1}{16}$



Rubicon
~~9.5~~
9.75
9.55

.54 microp
20.5
25.8
27.0
20.0
20.0
20.0
20.0
×10.8
10.8
5.0 3.0



R
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open

Std. .0410 ω leads. Coils .2 %

9.054 ω	9 ω
90.223 ω	90
901.84	900
9017.	9000

		A.	B
200.44	200	100	100
110.29	110	10	100
1102.2		1000	100
11.065		1	10

.00.2

~~$\frac{20}{10000}$~~

Fig. 1.
Fig 2
A
B
GA.
10
9
8

fig. 1, the set is arranged for measuring
Then X=R$\frac{A}{B}$. The needle swinging to + means too large a resistance
arranged for measuring low resistance.
— means too small a resistance.—To connect in an outside battery, remove the terminal cords from the battery tips and connect the outside
battery, with positive terminal to + battery post and negative terminal to — battery post.—To connect Golvanometer, Battery, and
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Early version of a

an Wheatstone Bridge

Used for measuring resistance

in an electric wire.

Belonged to Grand father Kinraide

Not any good per

Bob Kinraide

Blocks A, B,

Arms are to be of equal value, always have the most

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Above	1,110,000.0			B=1000	A=1	

Fig 2

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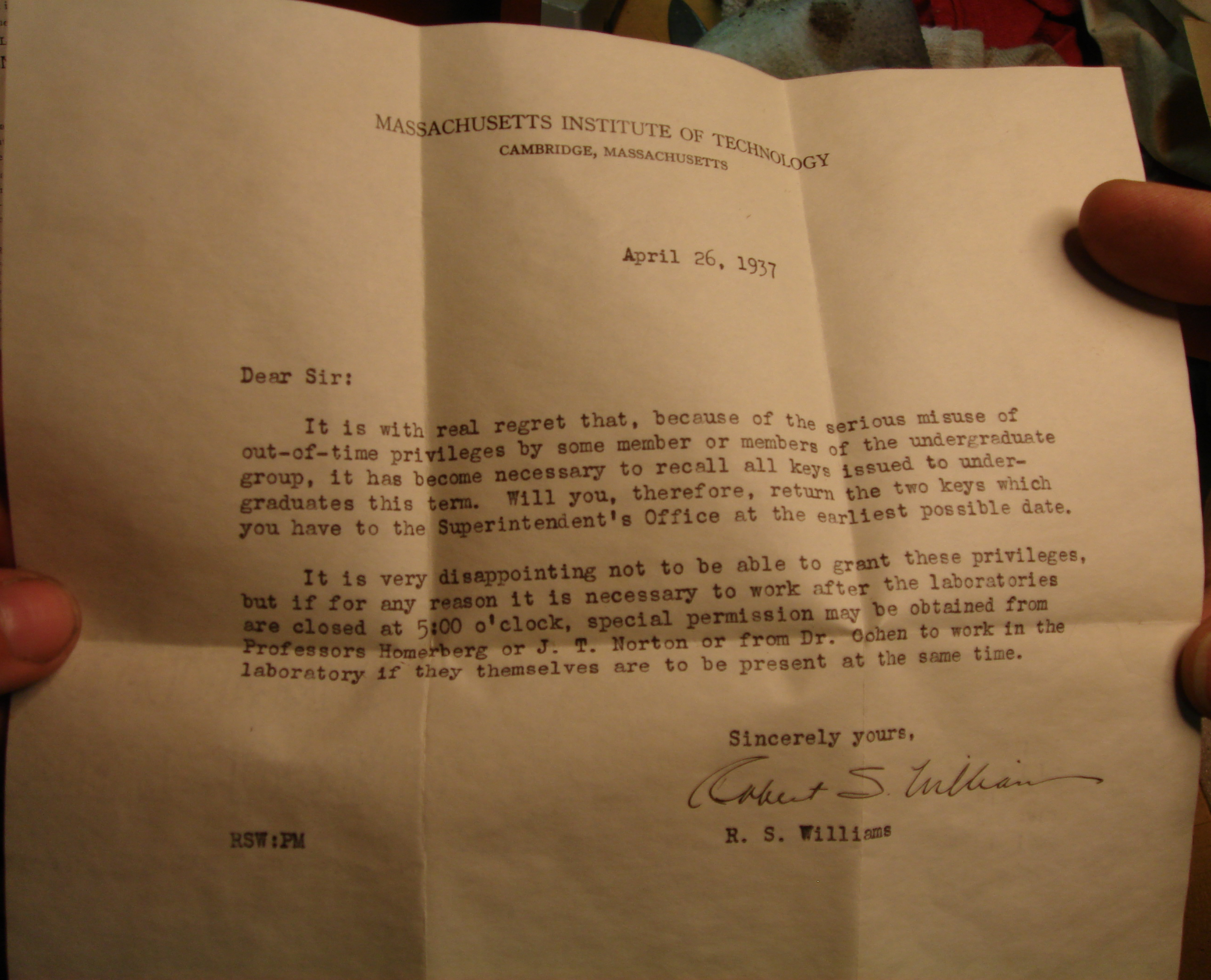

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April 26, 1937

Dear Sir:

It is with real regret that, because of the serious misuse of out-of-time privileges by some member or members of the undergraduate group, it has become necessary to recall all keys issued to undergraduates this term. Will you, therefore, return the two keys which you have to the Superintendent's Office at the earliest possible date.

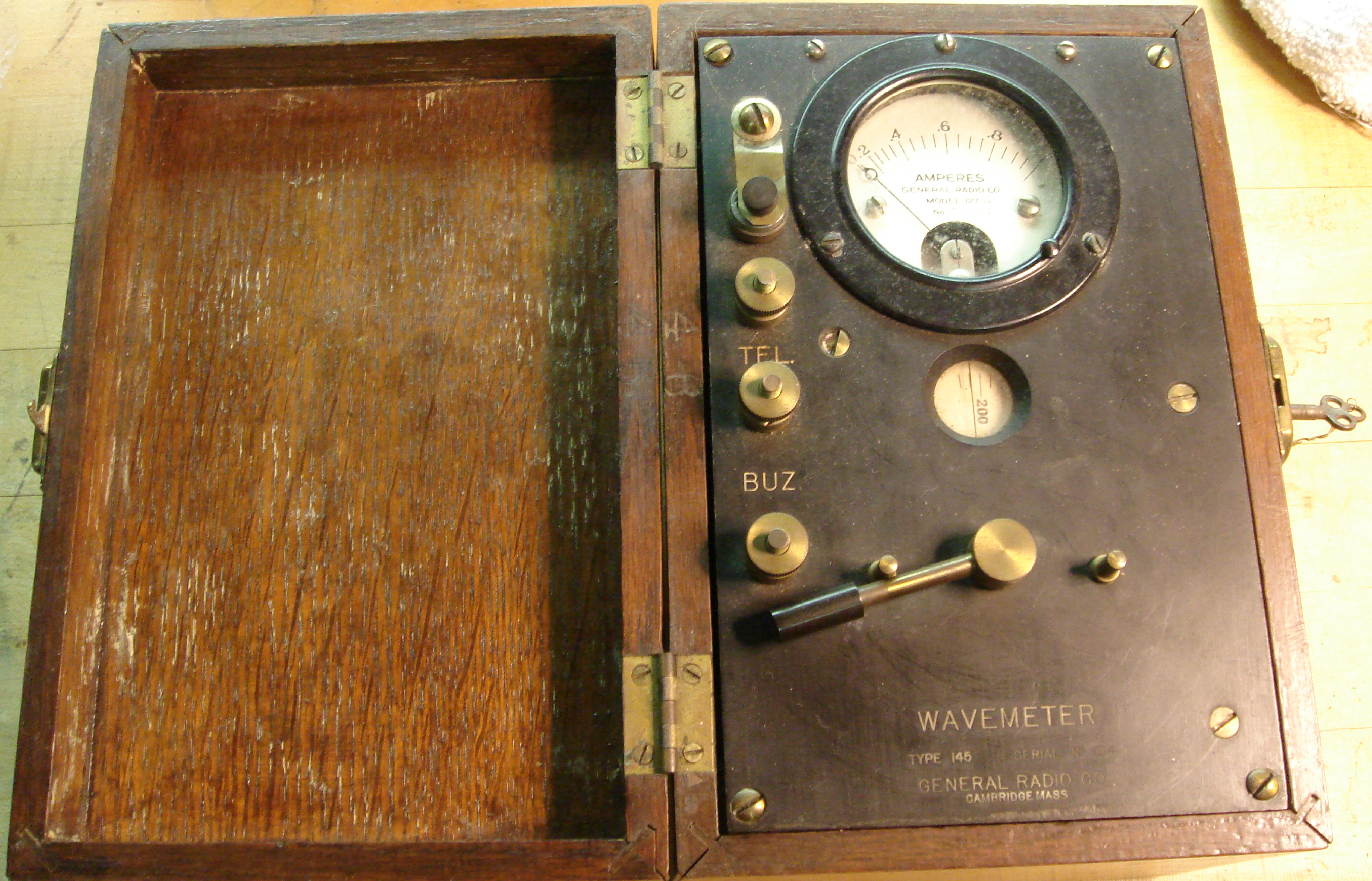
It is very disappointing not to be able to grant these privileges, but if for any reason it is necessary to work after the laboratories are closed at 5:00 o'clock, special permission may be obtained from Professors Homerberg or J. T. Norton or from Dr. Cohen to work in the laboratory if they themselves are to be present at the same time.

Sincerely yours,

Robert S. Williams

R. S. Williams

RSW:PM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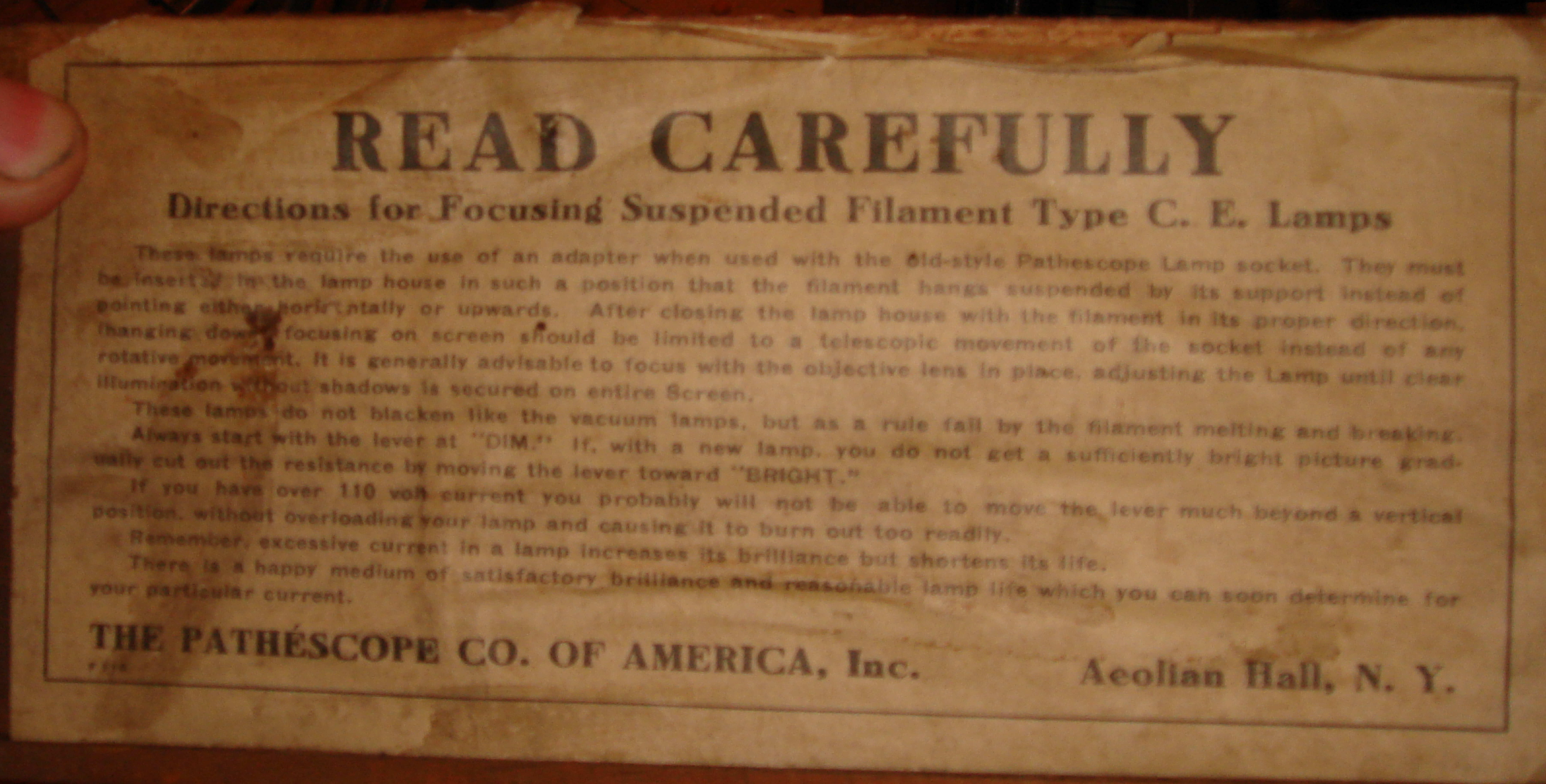

READ CAREFULLY

Directions for Focusing Suspended Filament Type C. E. Lamps

These lamps require the use of an adapter when used with the old-style Pathescope Lamp socket. They must be inserted in the lamp house in such a position that the filament hangs suspended by its support instead of pointing either horizontally or upwards. After closing the lamp house with the filament in its proper direction, hanging down, focusing on screen should be limited to a telescopic movement of the socket instead of any rotative movement. It is generally advisable to focus with the objective lens in place, adjusting the Lamp until clear illumination without shadows is secured on entire Screen.

These lamps do not blacken like the vacuum lamps, but as a rule fail by the filament melting and breaking.

Always start with the lever at "DIM." If, with a new lamp, you do not get a sufficiently bright picture gradually cut out the resistance by moving the lever toward "BRIGHT."

If you have over 110 volt current you probably will not be able to move the lever much beyond a vertical position, without overloading your lamp and causing it to burn out too readily.

Remember, excessive current in a lamp increases its brilliance but shortens its life.

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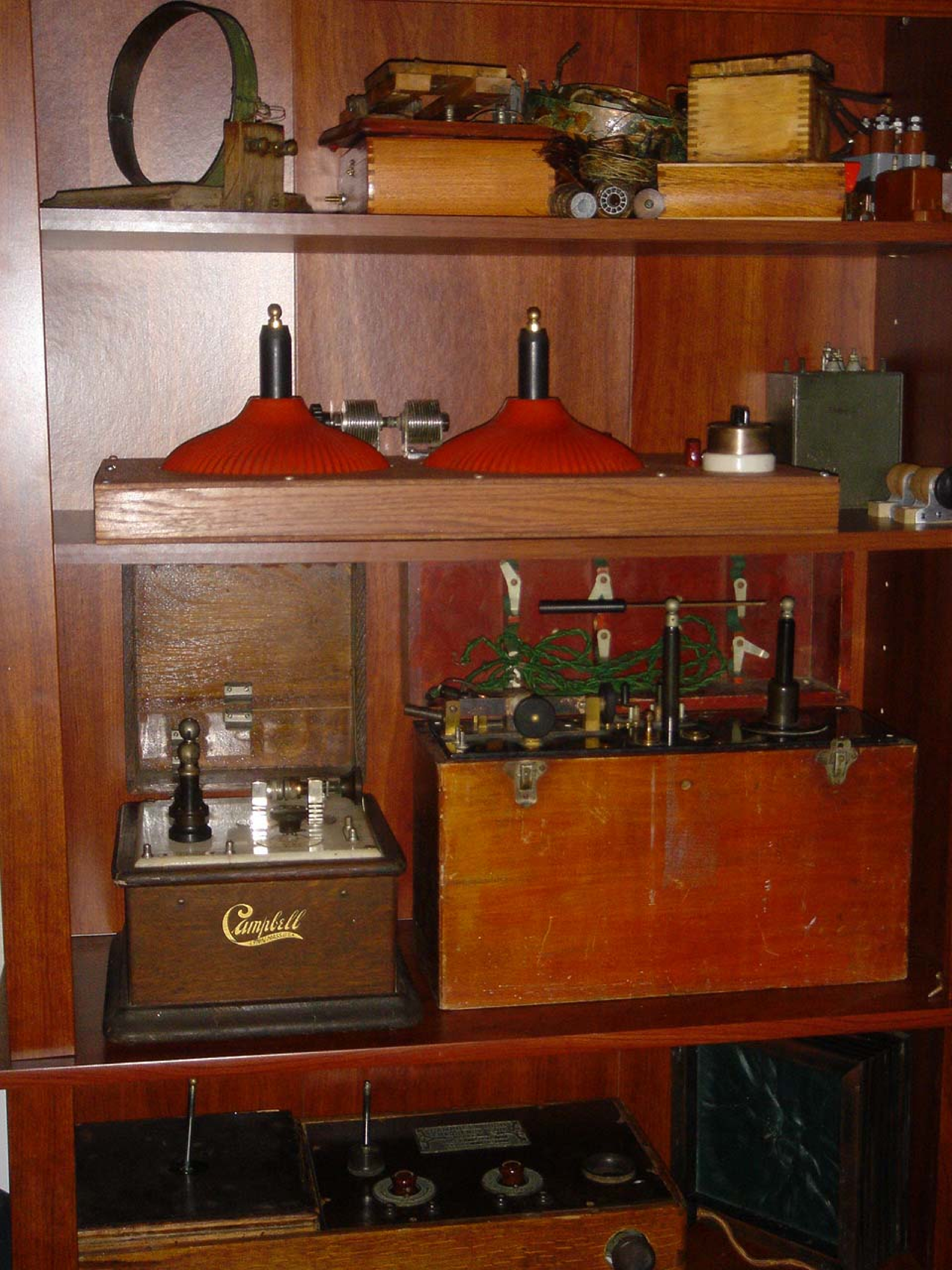
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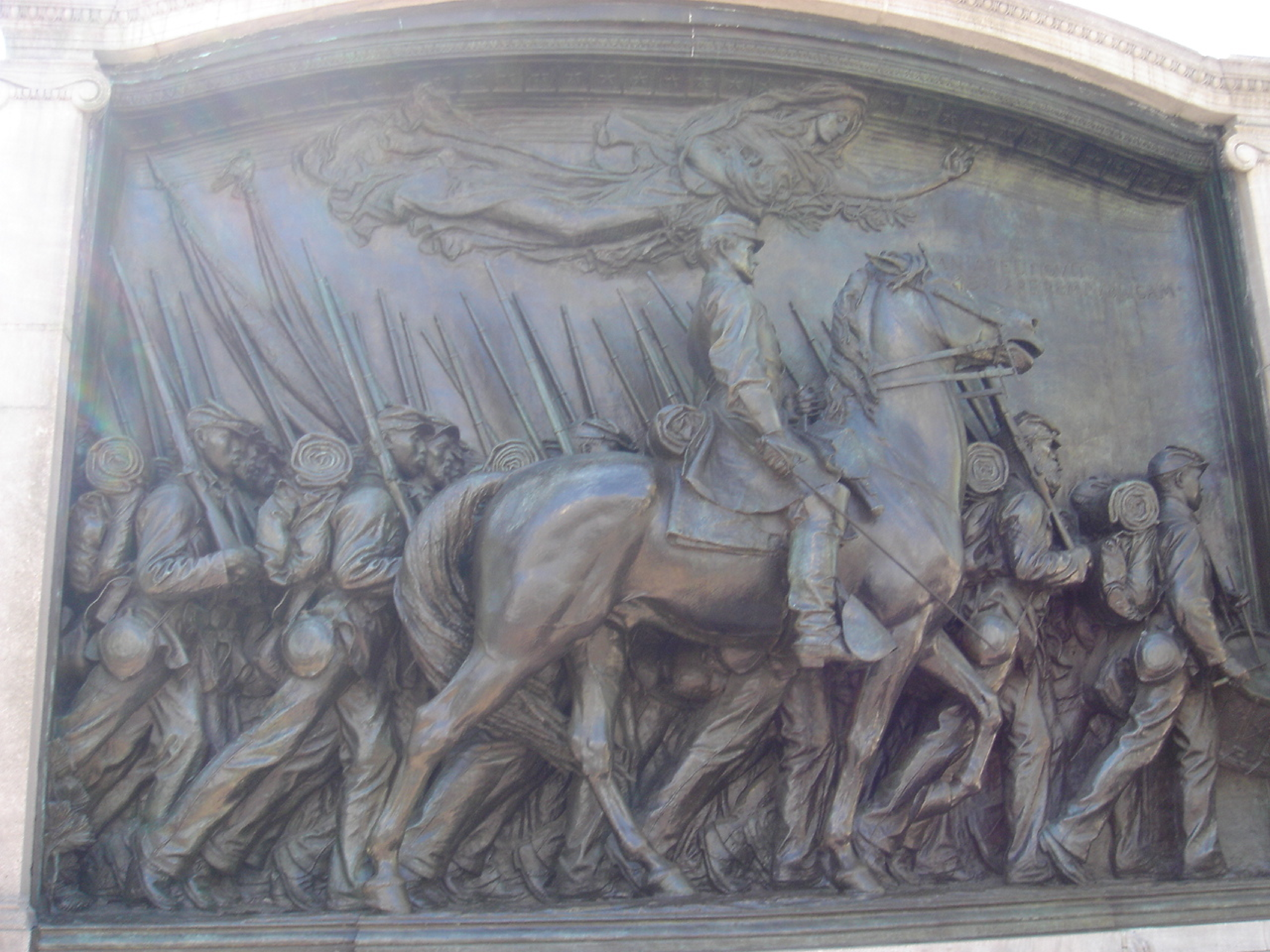

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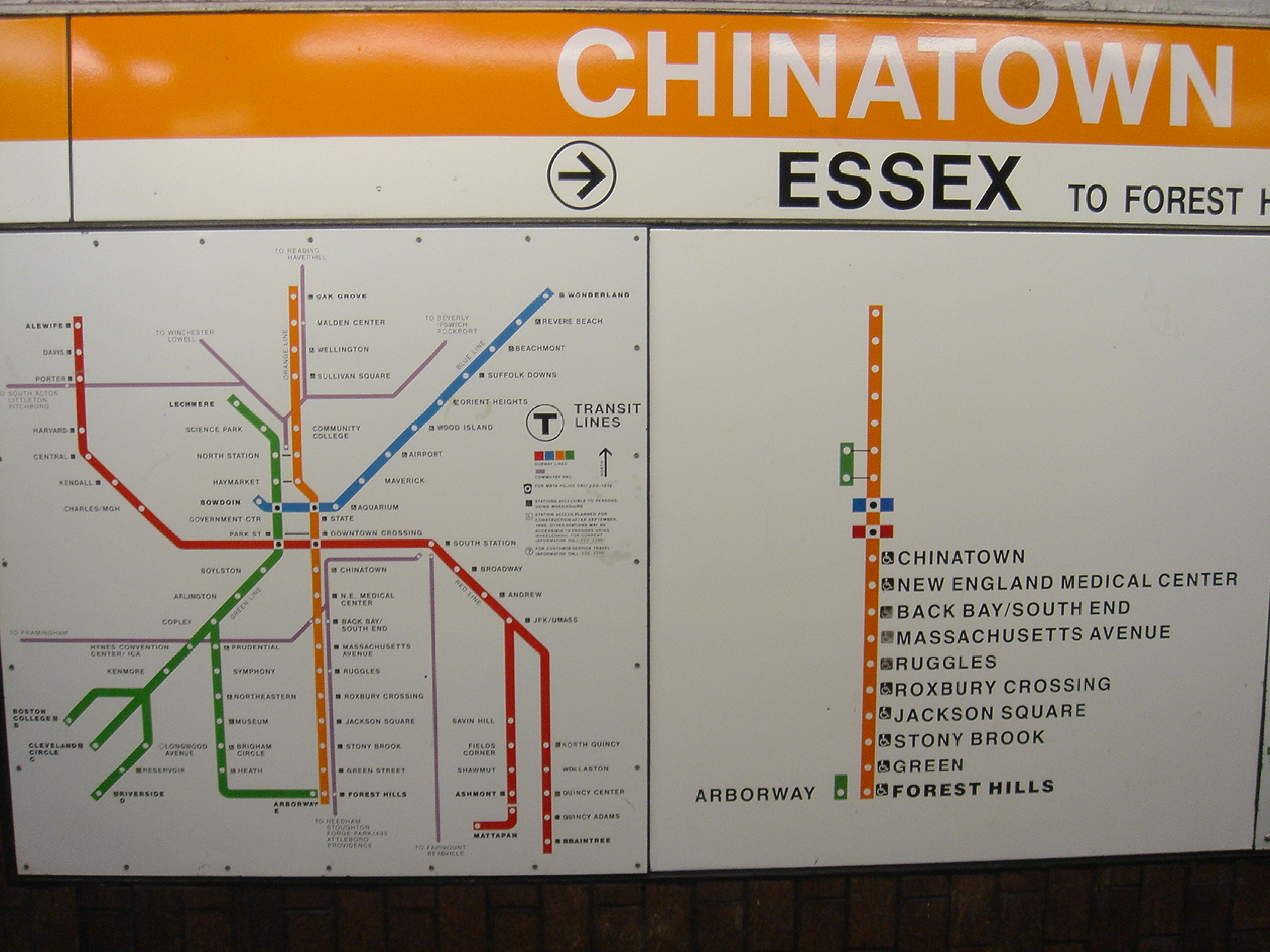
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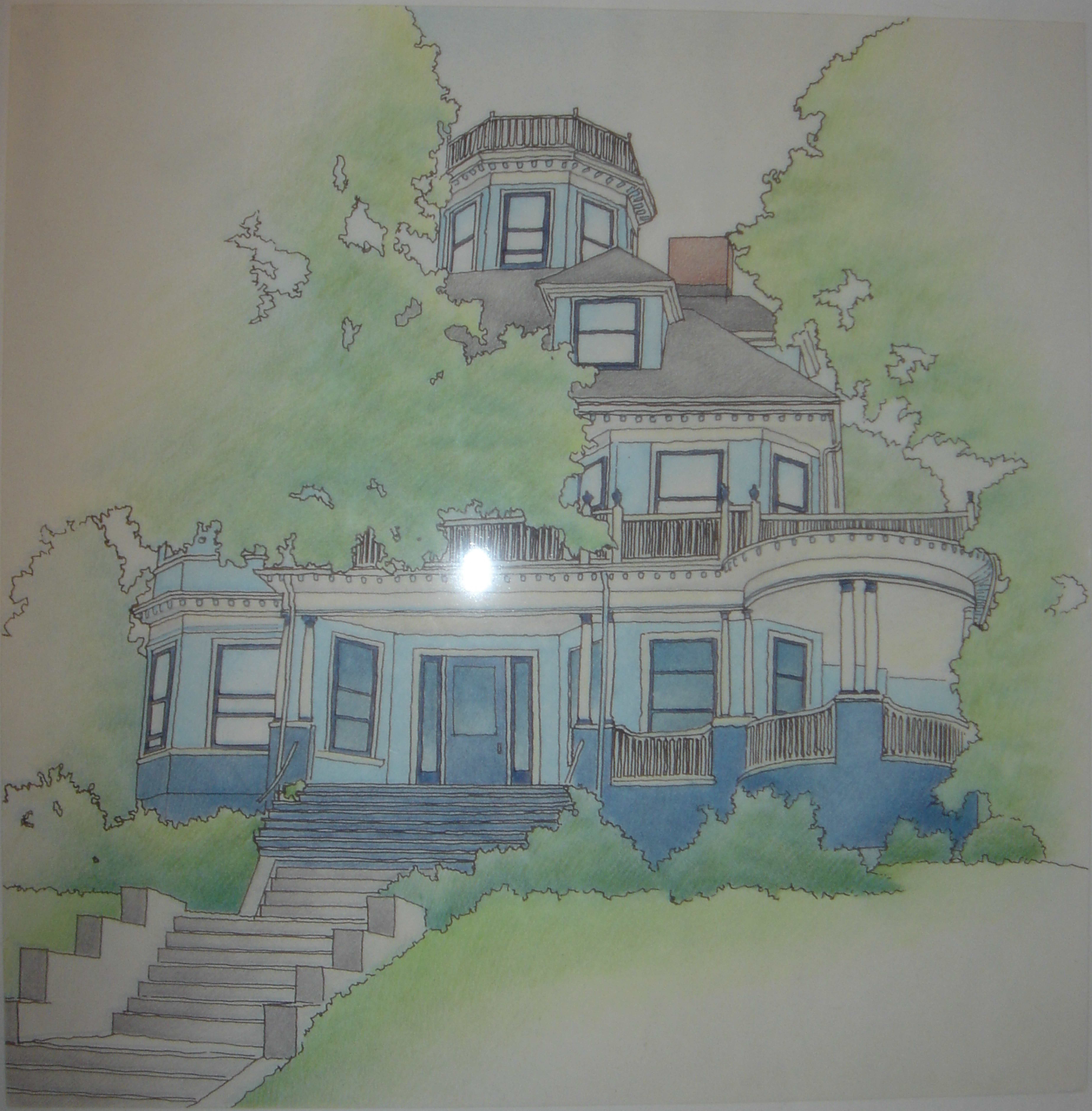

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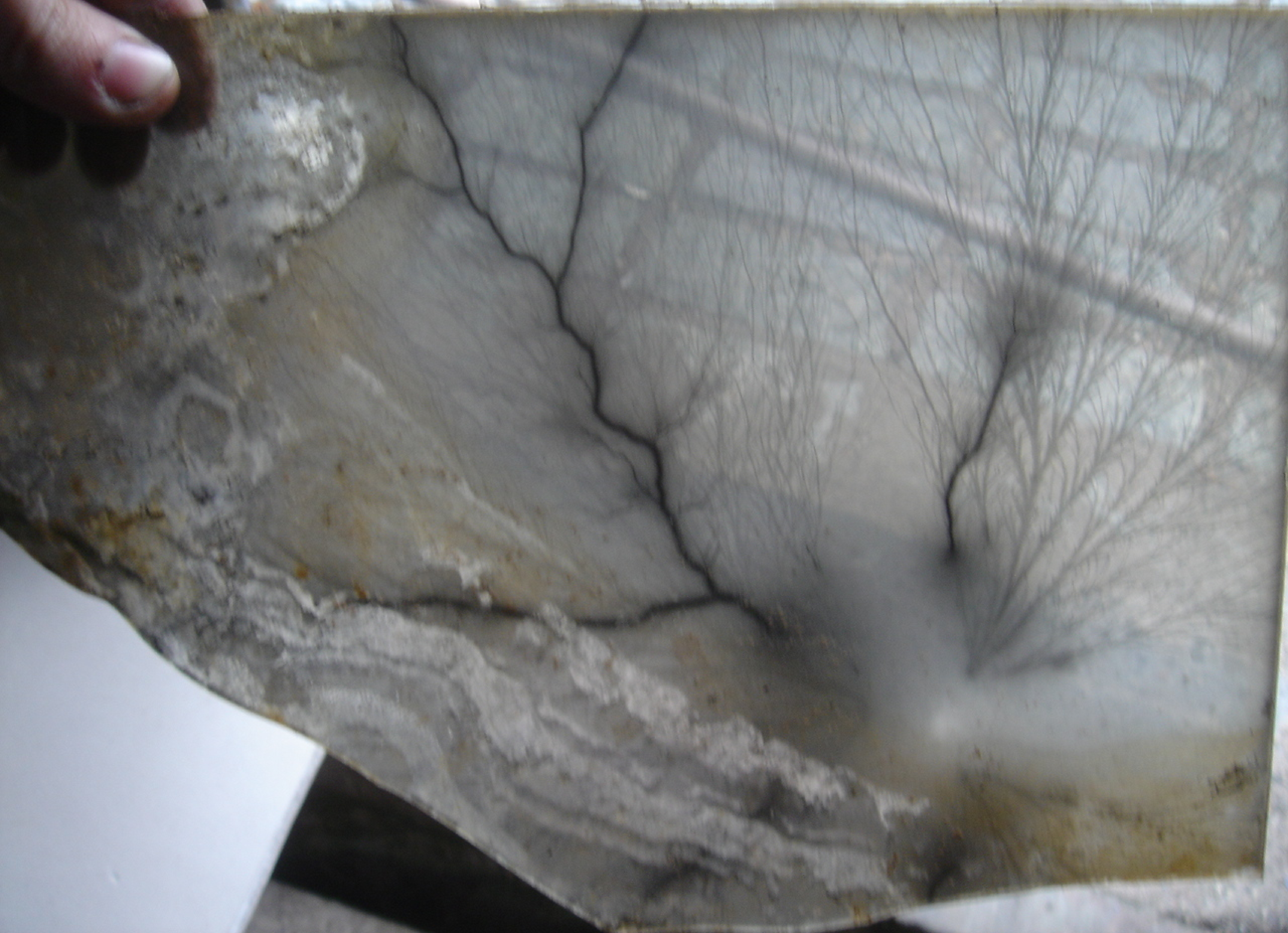
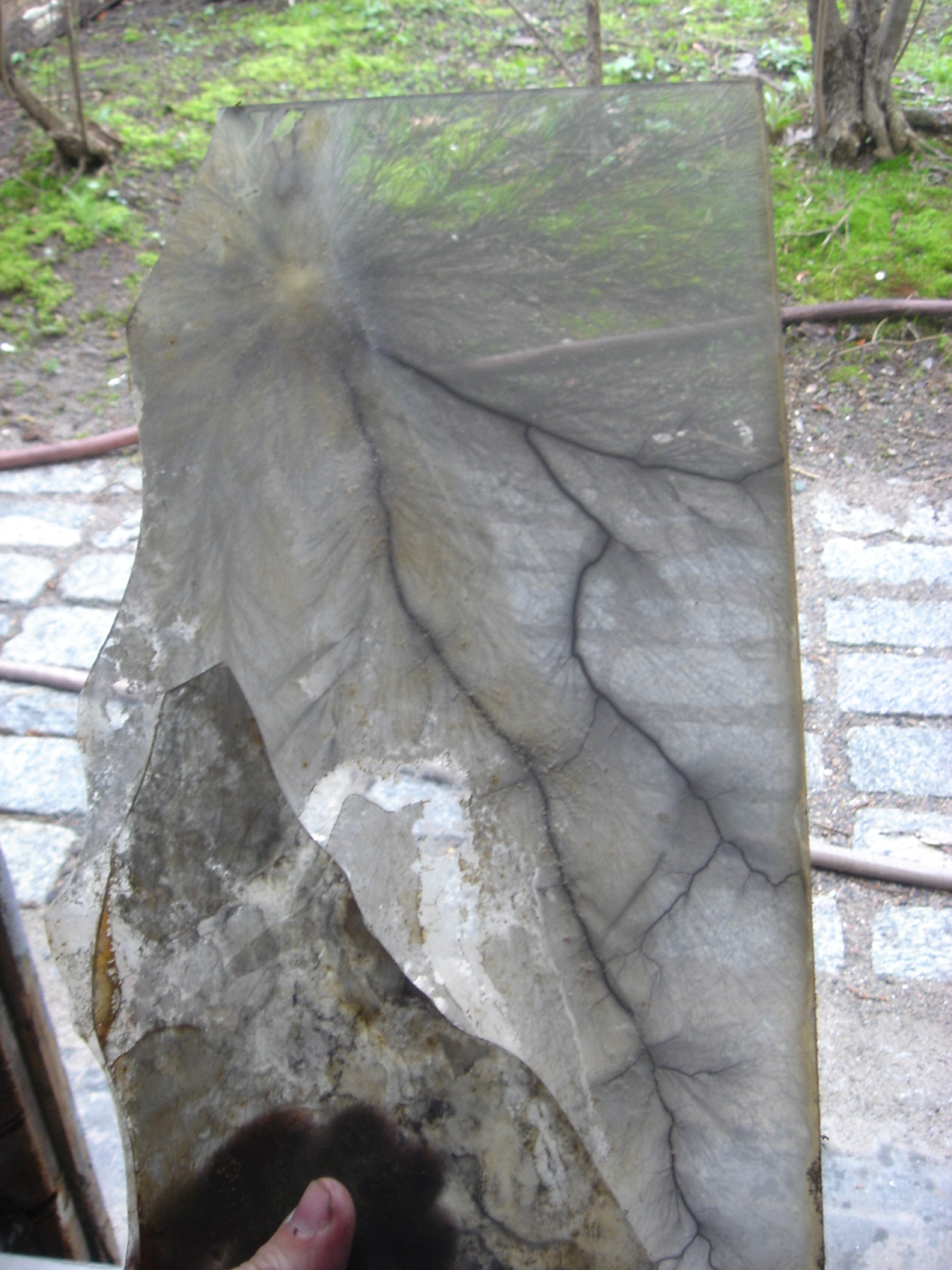
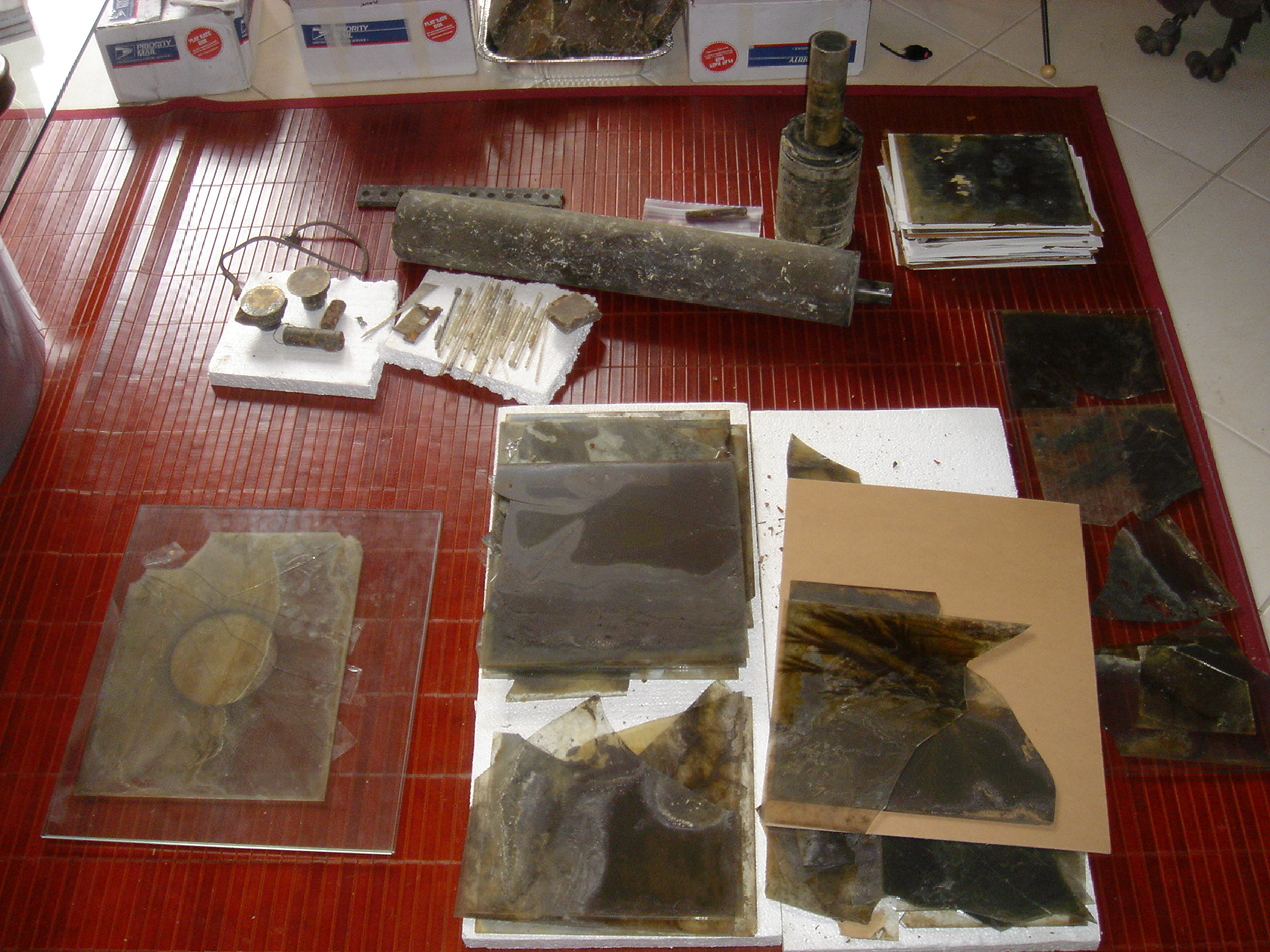
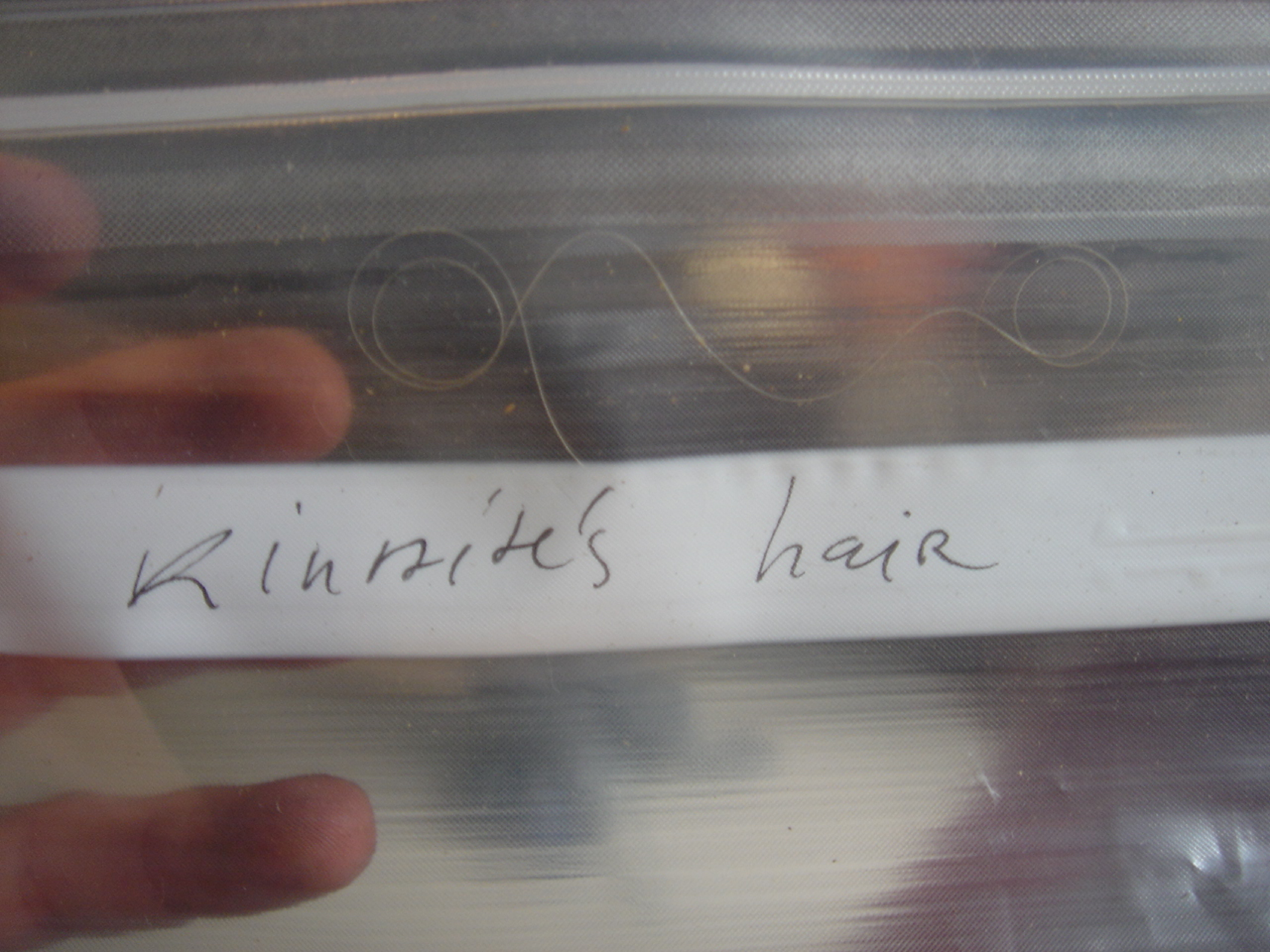
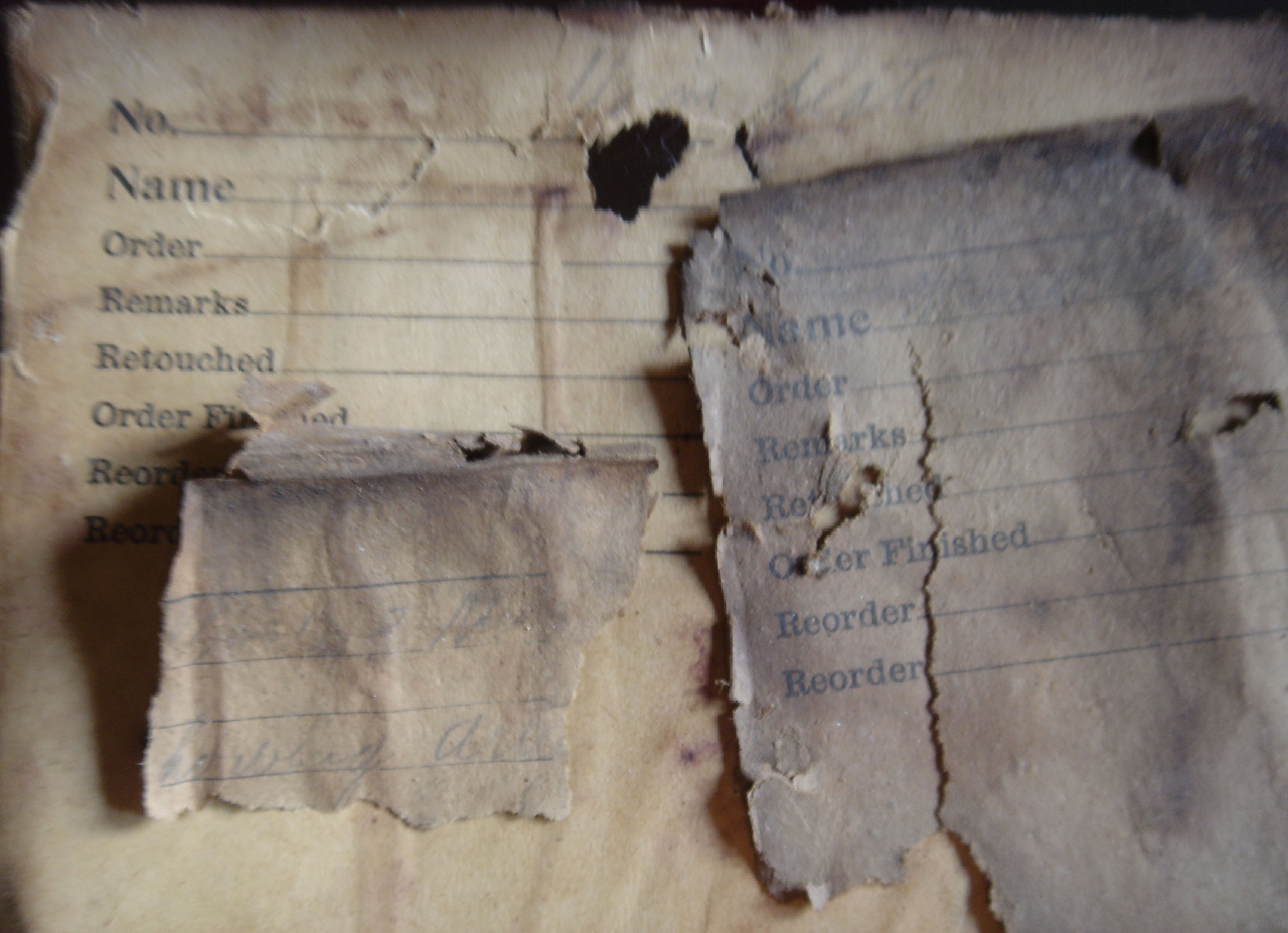




OLD NAVY


PRIORITY MAIL
FLAT RATE BOX
PRIORITY MAIL
FLAT RATE BOX
FLAT RATE BOX


Kinrite's hair



[illegible]

No.

Name

Order

Remarks

Retouched

Order Fi~~n~~ished

Reorder

Reorder

[illegible]

[illegible]

No.

Name

Order

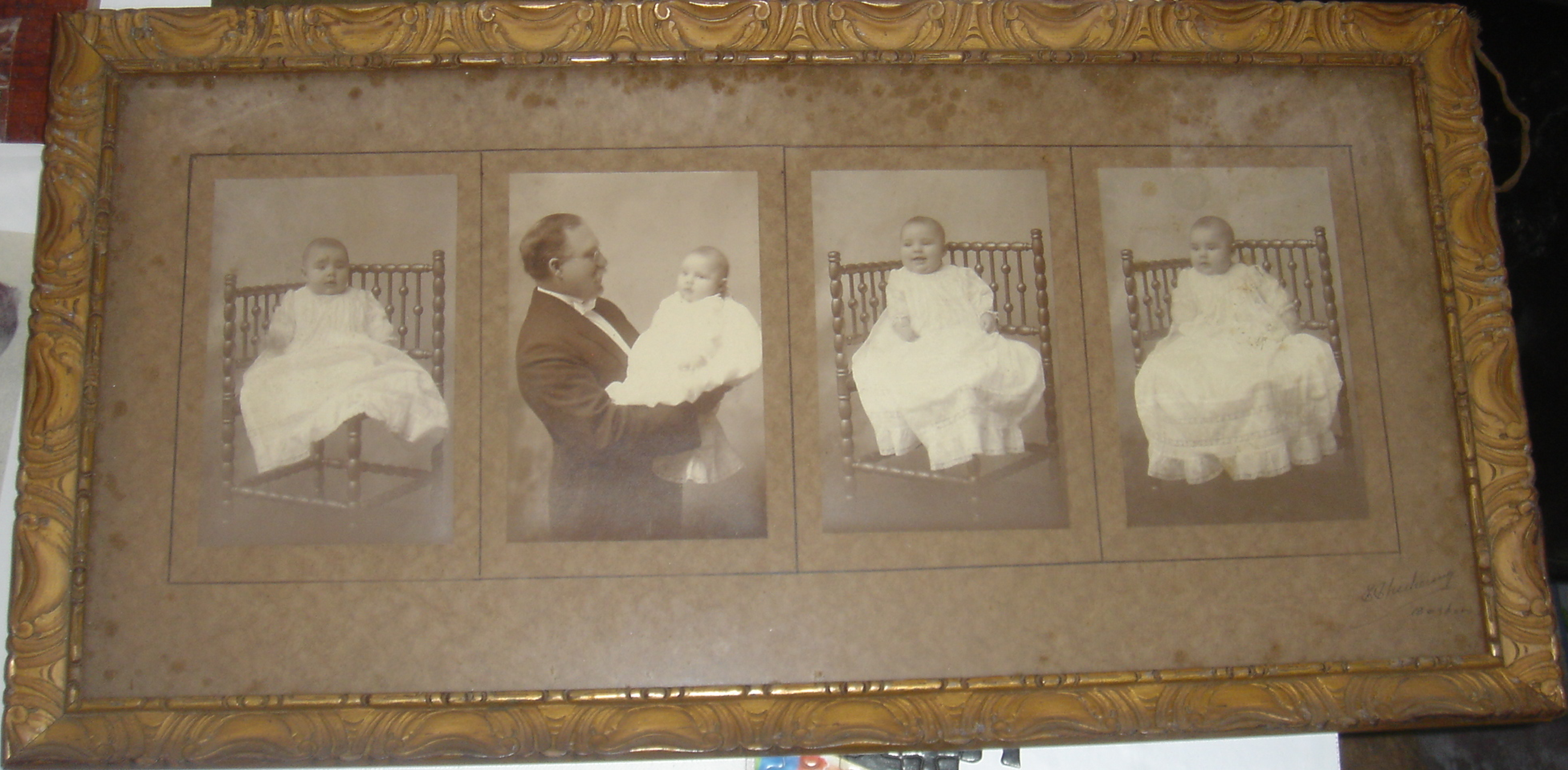
Remarks

Retouched

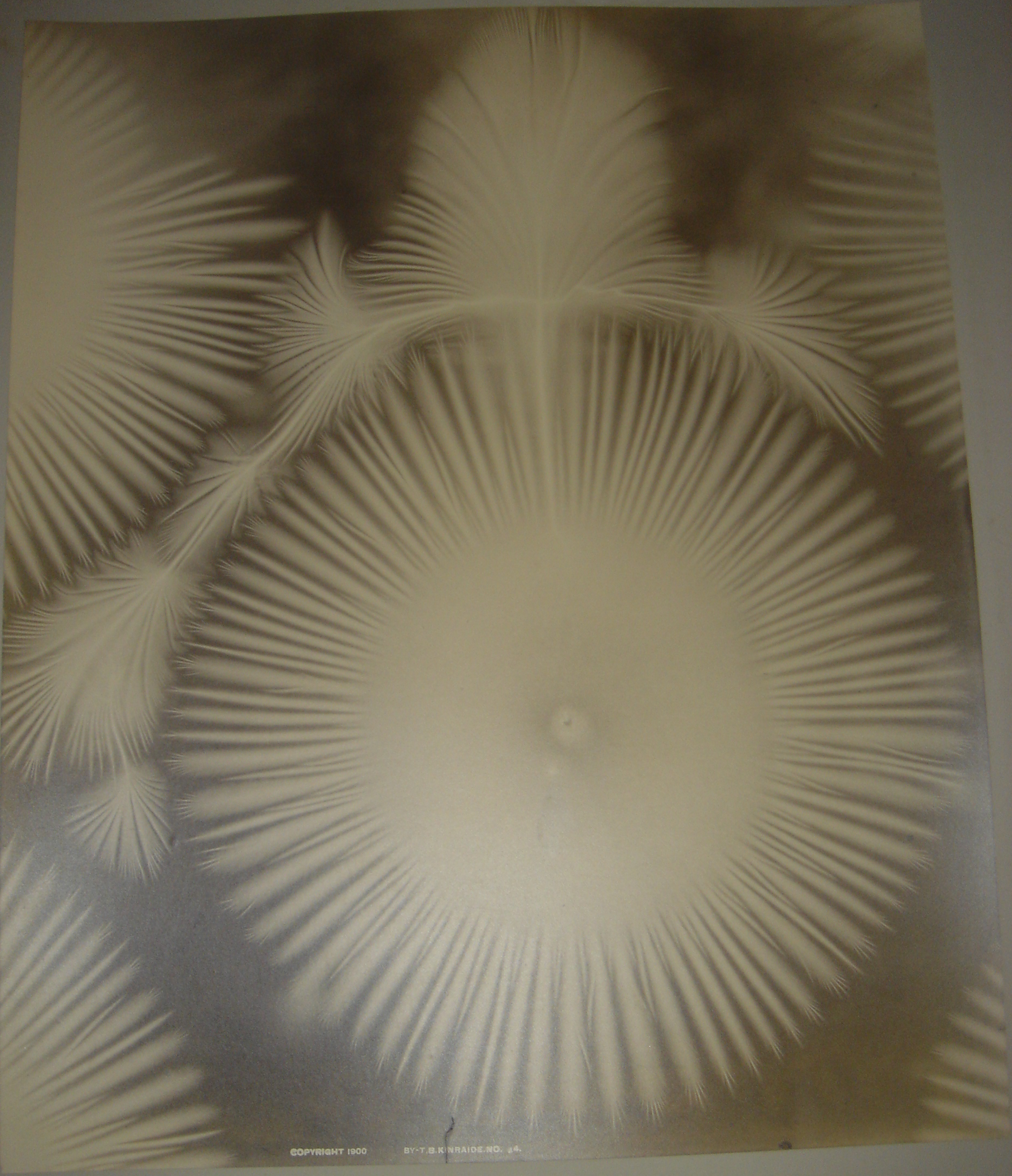
Order Finished

Reorder

Reorder


Chickering
Boston

WEEKEND
MURPHY L
FOR LAU
VOLUME 221
Range of Motion:



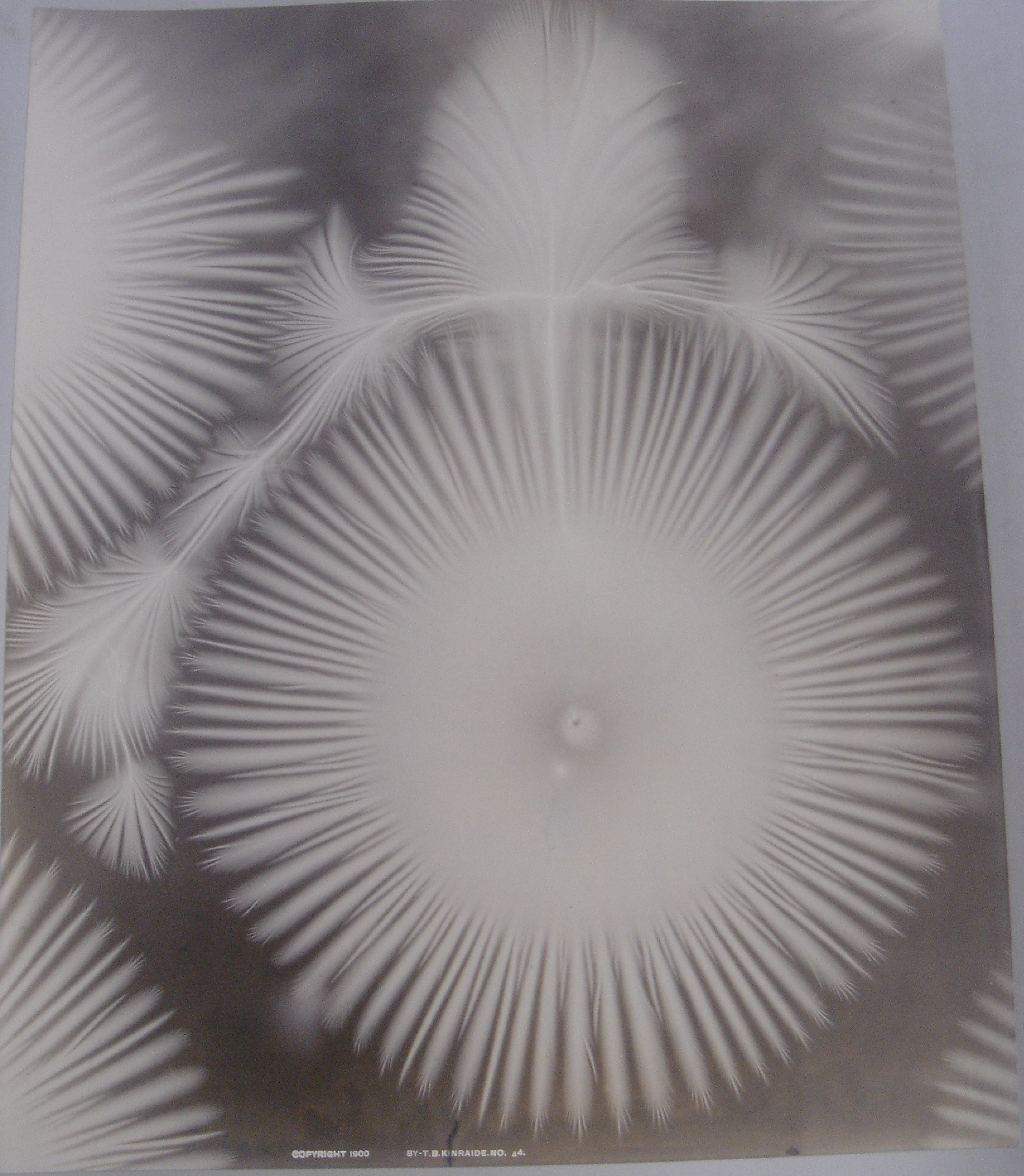
COPYRIGHT 1900 BY-T.B.KINRAIDE.NO. 44.

No. 44.

A STUDY OF THE NEGATIVE PHASE OF ELECTRICITY.

(Enlarged)

Condenser Series.



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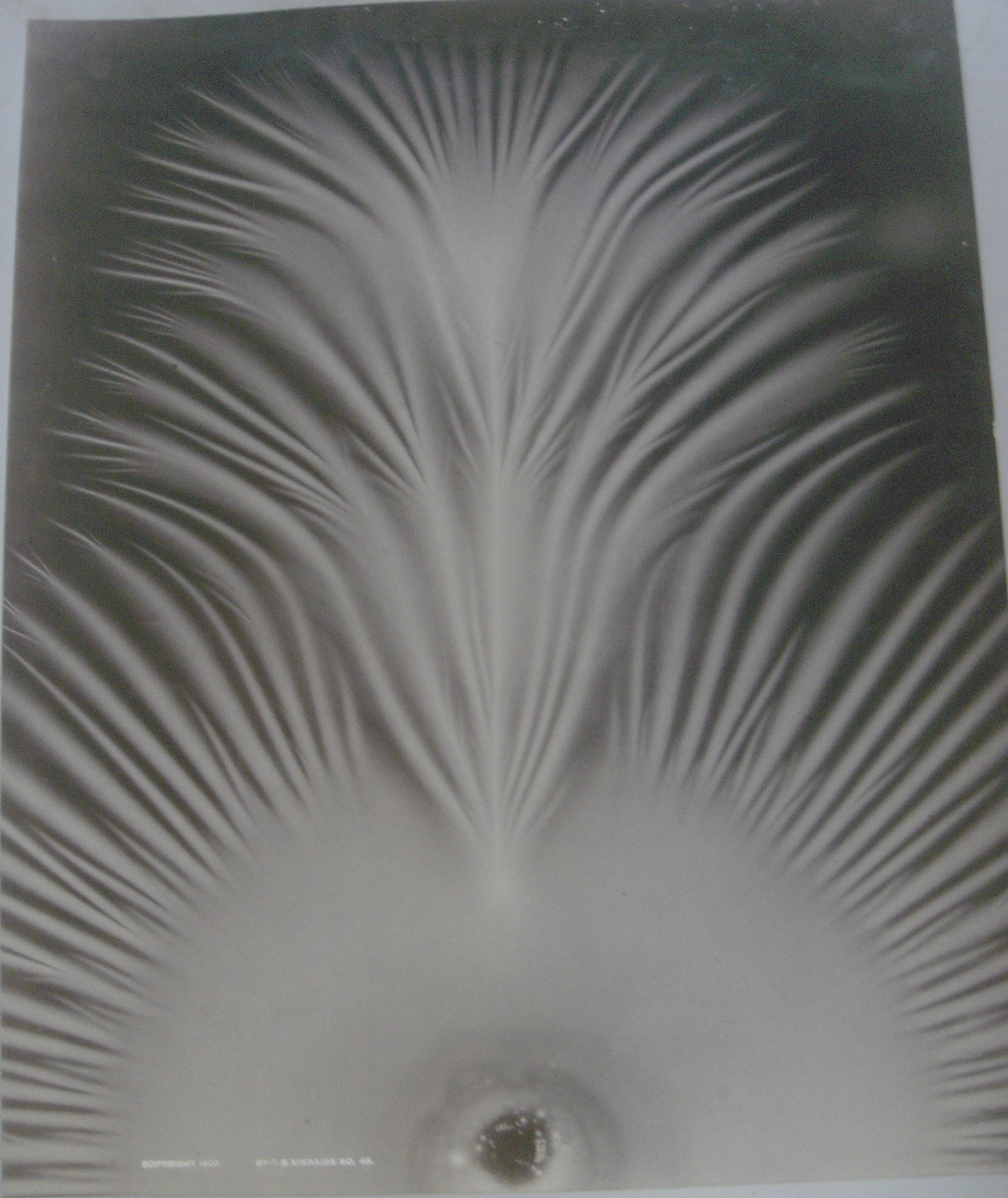
No. 44. A STUDY OF THE NEGATIVE PHASE OF ELECTRICITY. (Enlarged)

Condenser Series.

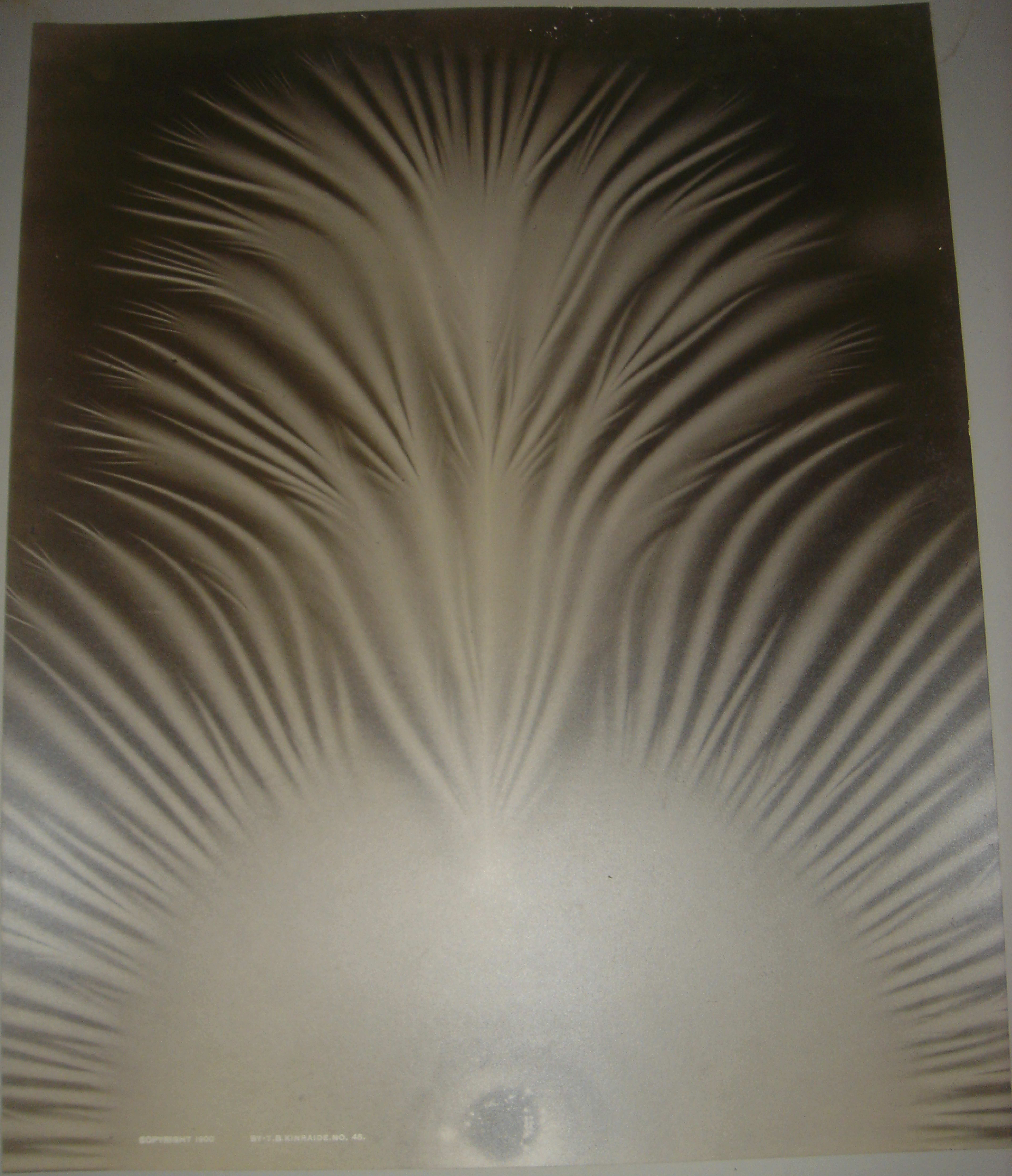

COPYRIGHT 1900
BY T. B. KINRAIDE NO. 45.

No. 45.

A STUDY OF THE NEGATIVE PHASE OF ELECTRICITY.

(Enlarged)

[illegible]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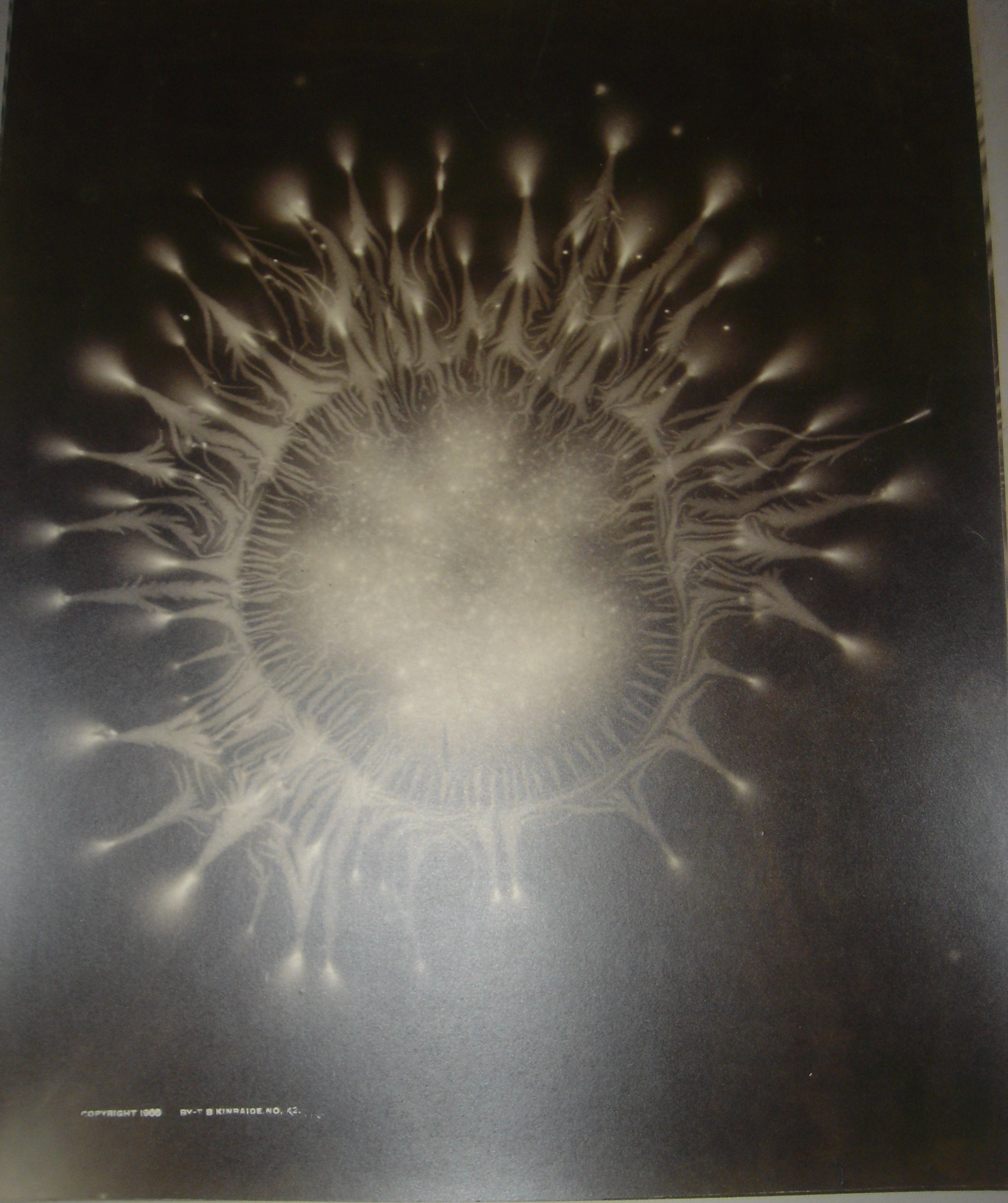
No. 45.

A STUDY OF THE NEGATIVE PHASE OF ELECTRICITY.

(Enlarged)

Condenser Series.



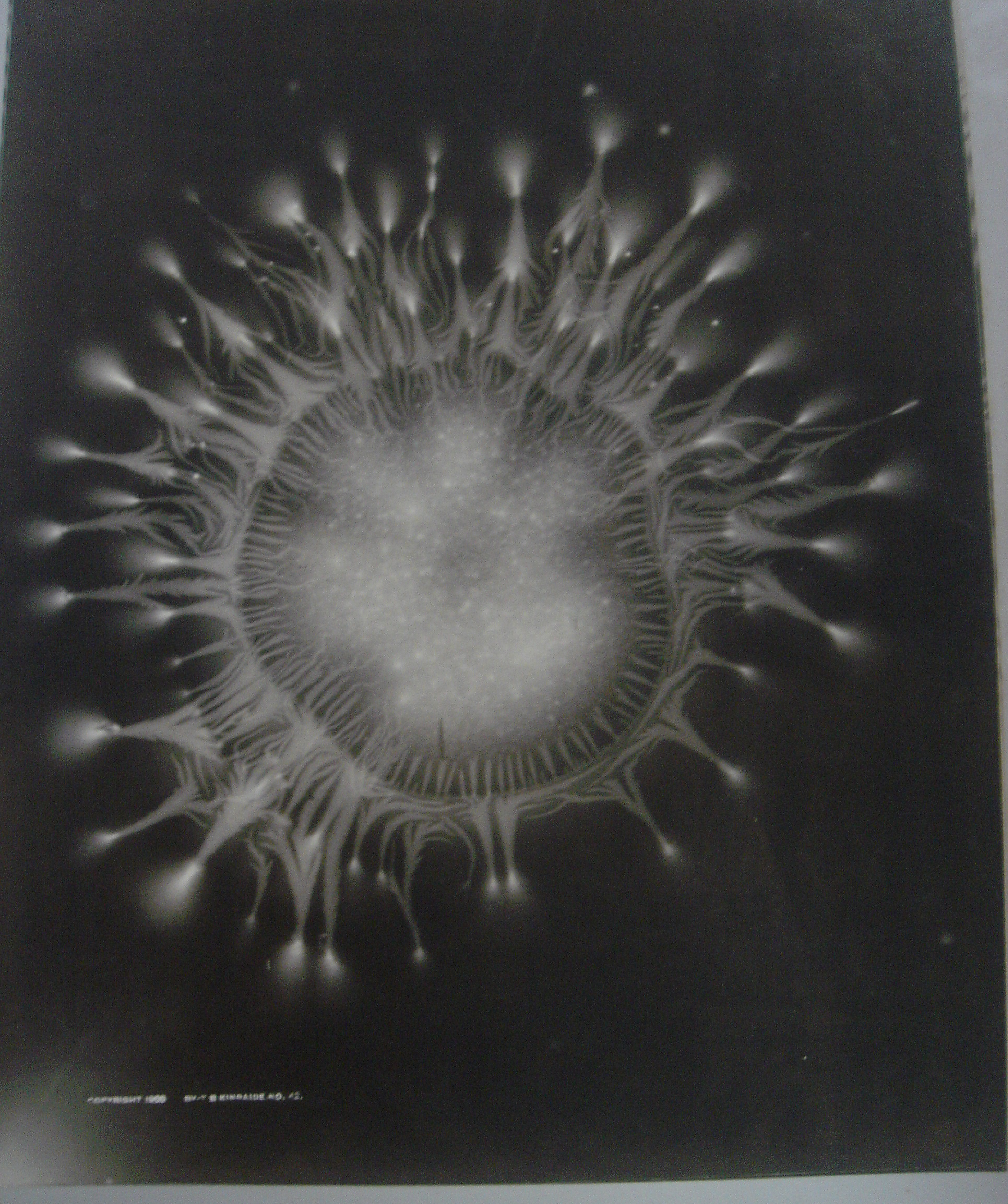
COPYRIGHT 1900 BY-T B KINRAIDE.NO. 42.

No. 46. PRIMARY ENTITIES OF ELECTRICITY. (Enlarged)

See No. 14.

Discharge of Electricity through a two inch sphere placed upon a photograph plate laid film side down upon a positively charged uncoated condenser surface. The phenomena of the two phases of Electricity in series between condenser surfaces.

Condenser Series.



No. 46. **PRIMARY ENTITIES OF ELECTRICITY.** (Enlarged)

See No. 14.

Discharge of Electricity through a two inch sphere placed upon a photograph plate laid film side down upon a positively charged elevated condenser surface. The phenomena of the two phases of Electricity in series between condenser surfaces.

Condenser Series.

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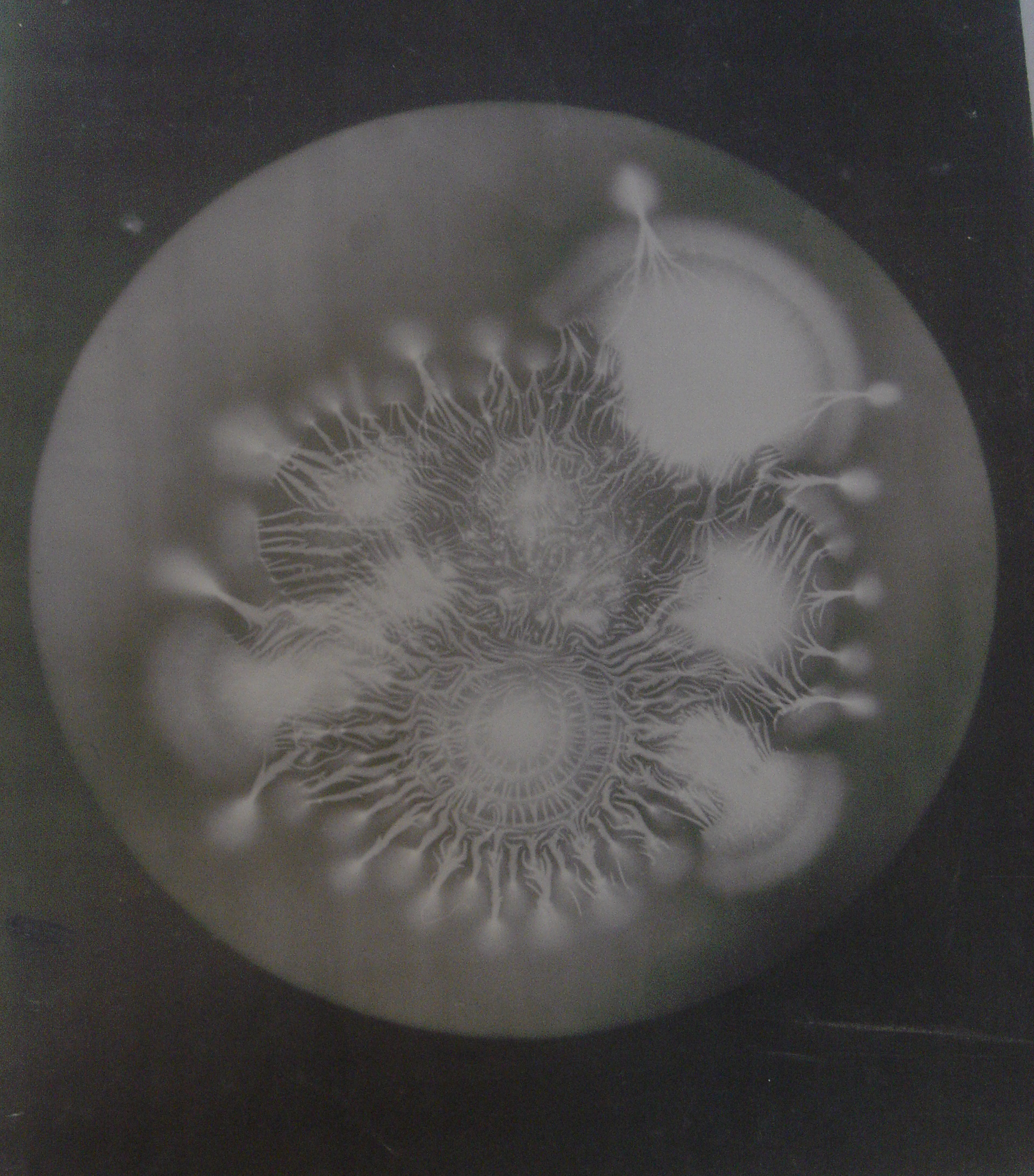
46

No. 46. [illegible]

[illegible]
charged [illegible]



COPYRIGHT 1900 BY-T.B.KINRAIDE.NO. 47.

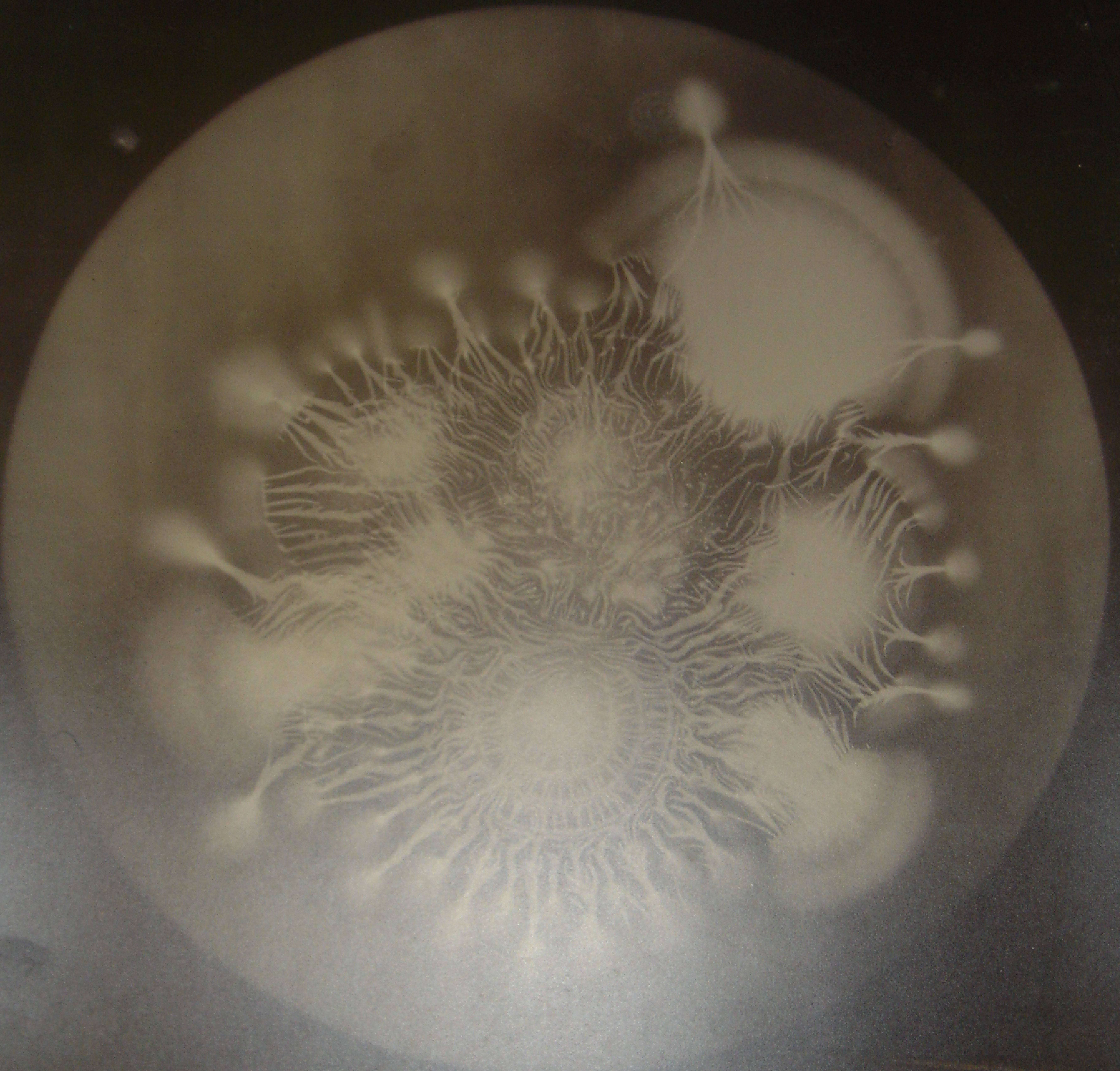
No. 47. (Enlarged)

PRIMARY ENTITIES OF ELECTRICITY.

See No. 14.

Discharge of Electricity through a two inch sphere placed upon a photograph plate laid film side down upon a positively charged uncoated condenser surface. The phenomena of the two phases of Electricity in series between condenser surfaces.

Condenser Series.



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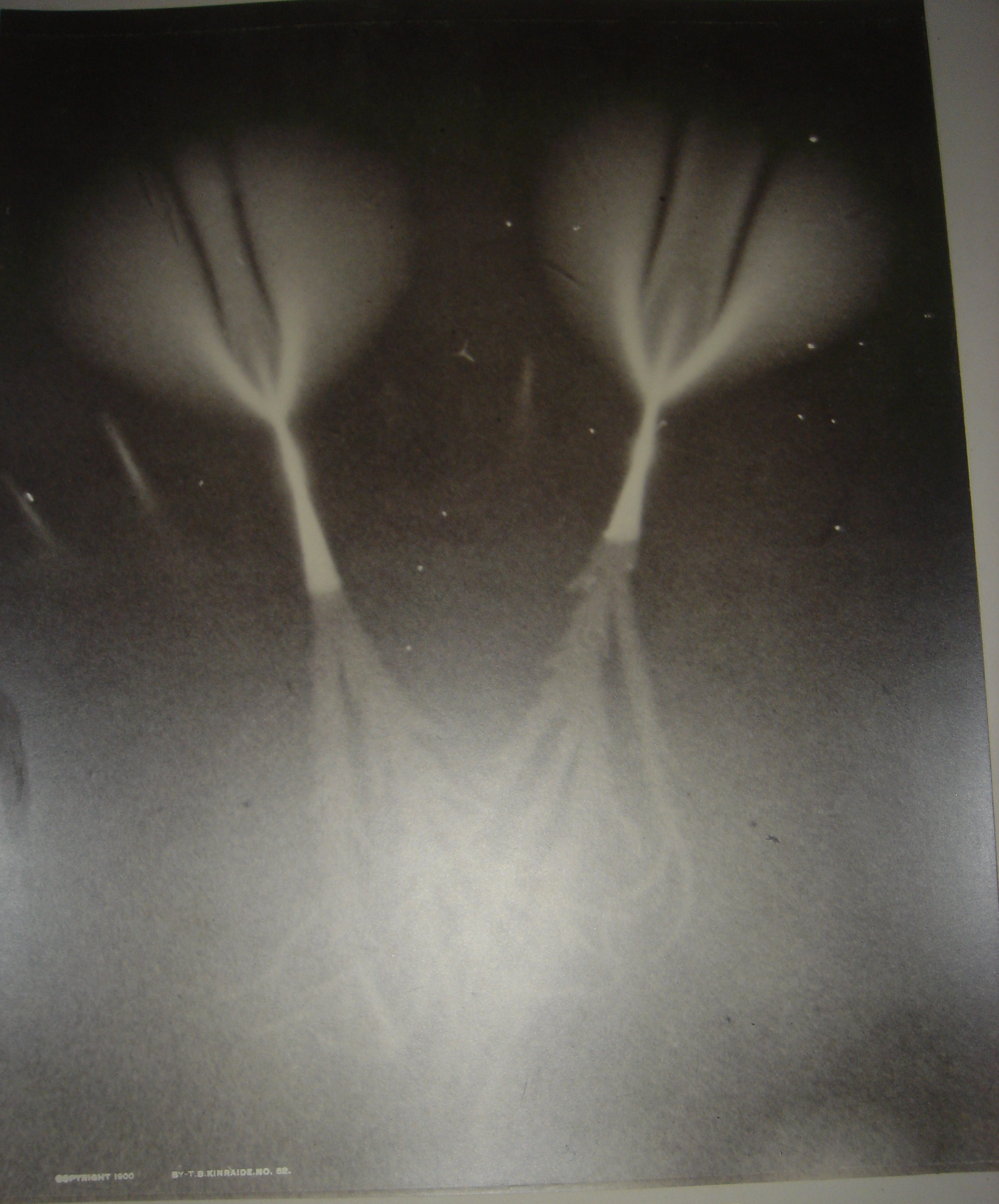
No. 47. PRIMARY ENTITIES OF ELECTRICITY. (Enlarged)

See No. 14.

Discharge of Electricity through a two inch sphere placed upon a photograph plate laid film side down upon a positively charged uncoated condenser surface. The phenomena of the two phases of Electricity in series between condenser surfaces.

Condenser Series.



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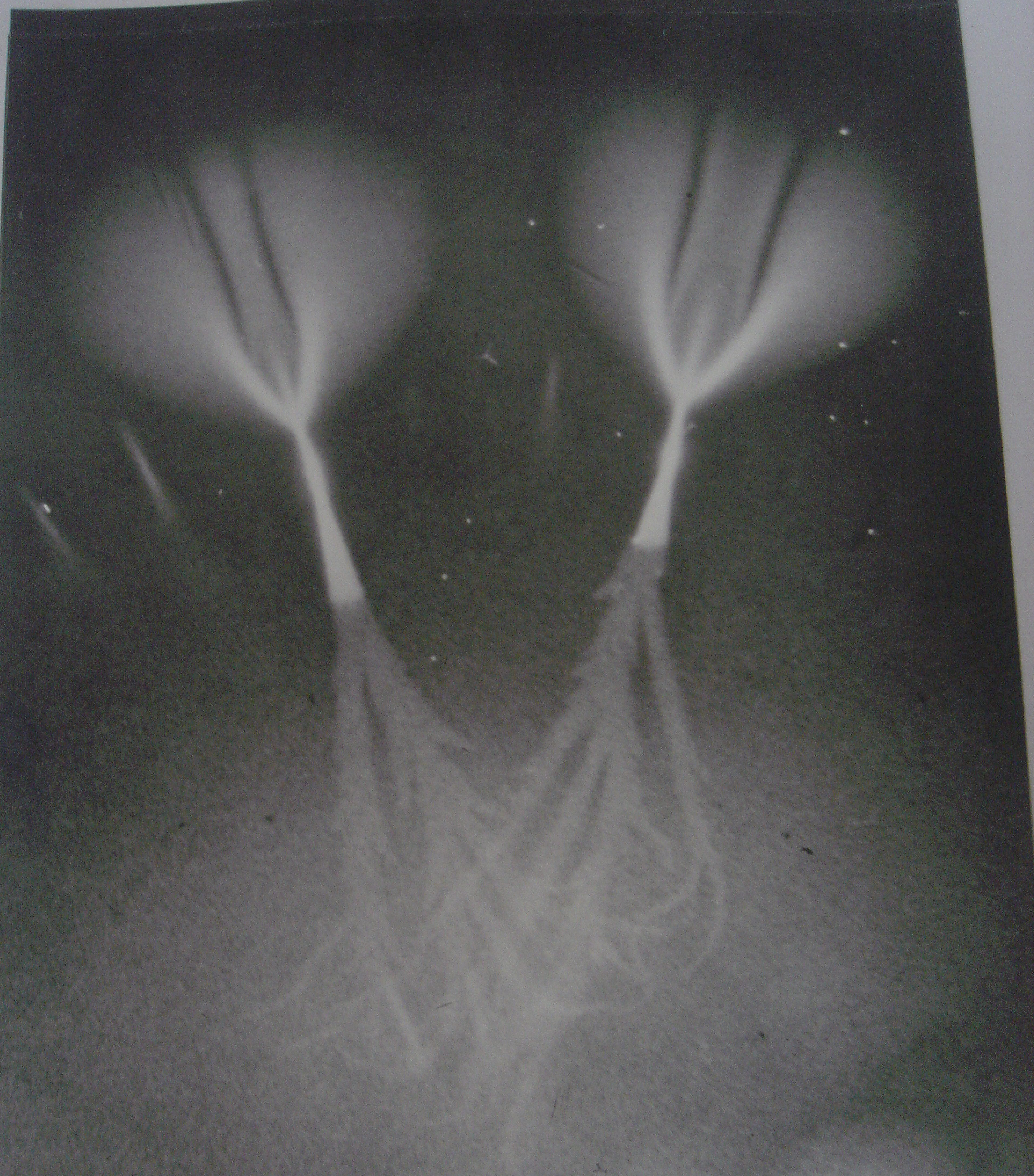
No. 47. **PRIMARY ENTITIES OF ELECTRICITY.** (Enlarged)

See No. 14.

Discharge of Electricity through a two inch sphere placed upon a photograph plate laid film side down upon a positively charged uncoated condenser surface. The phenomena of the two phases of Electricity in series between condenser surfaces.

Condenser Series.



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No. 47.

PRIMARY ENTITIES OF ELECTRICITY.

(Enlarged)

See No. 14.

Discharge of Electricity through a two inch sphere placed upon a photograph plate laid film side down upon a positively charged uncoated condenser surface. The phenomena of the two phases of Electricity in series between condenser surfaces.

Condenser Series.

BY-T.B.KINRAIDE.NO. 82.

No. 47.

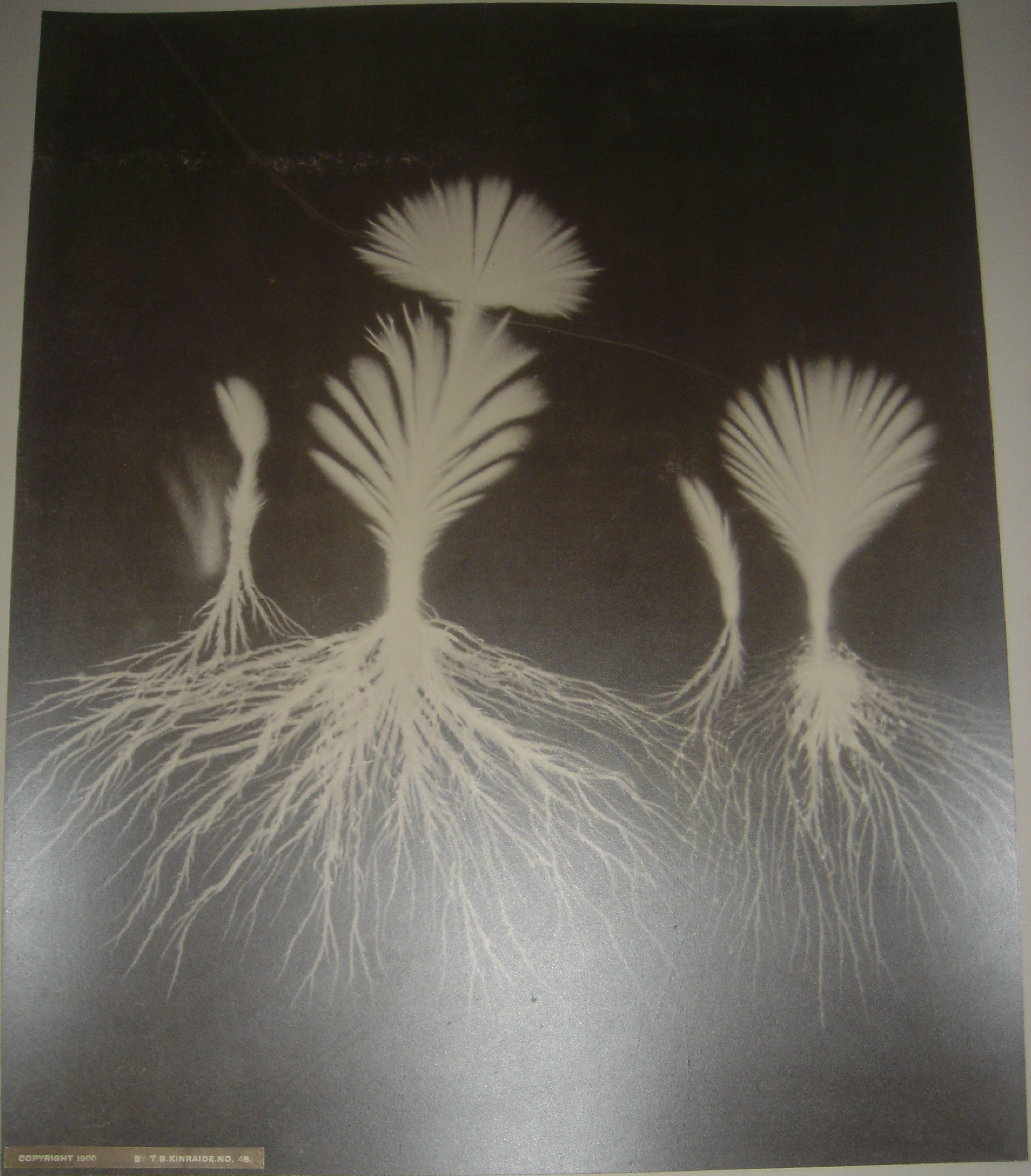
PRIMARY ENTITIES OF ELECTRICITY.

(Enlarged)

See No. 14.

Discharge of Electricity through a two inch sphere placed upon a photograph plate laid film side down upon a positively charged uncoated condenser surface. The phenomena of the two phases of Electricity in series between condenser surfaces.

Condenser Series.

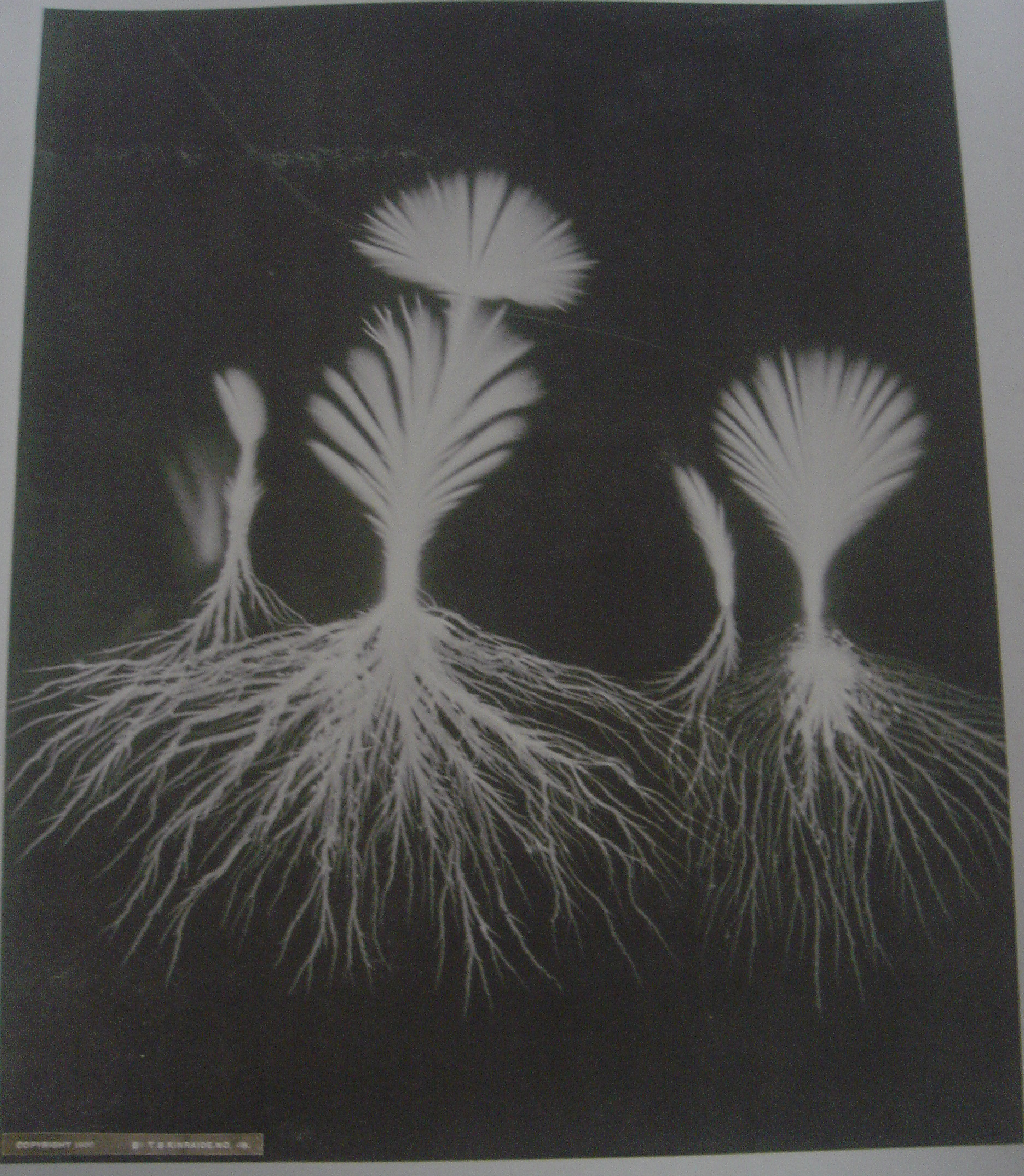


COPYRIGHT 1900 BY T.B.KINRAIDE.NO. 48.

No. 48. **COMPLEX ELECTRIC ENTITIES.** (Enlarged)

Electric Entities obtained from a surface Electrically divided into a Positive and Negative area. The Plumous or Negative end of the Entity is formed on the Positive area. The Positive end forms on the Negative area. The narrow stem joining the two phases marks the line of division between the two areas.

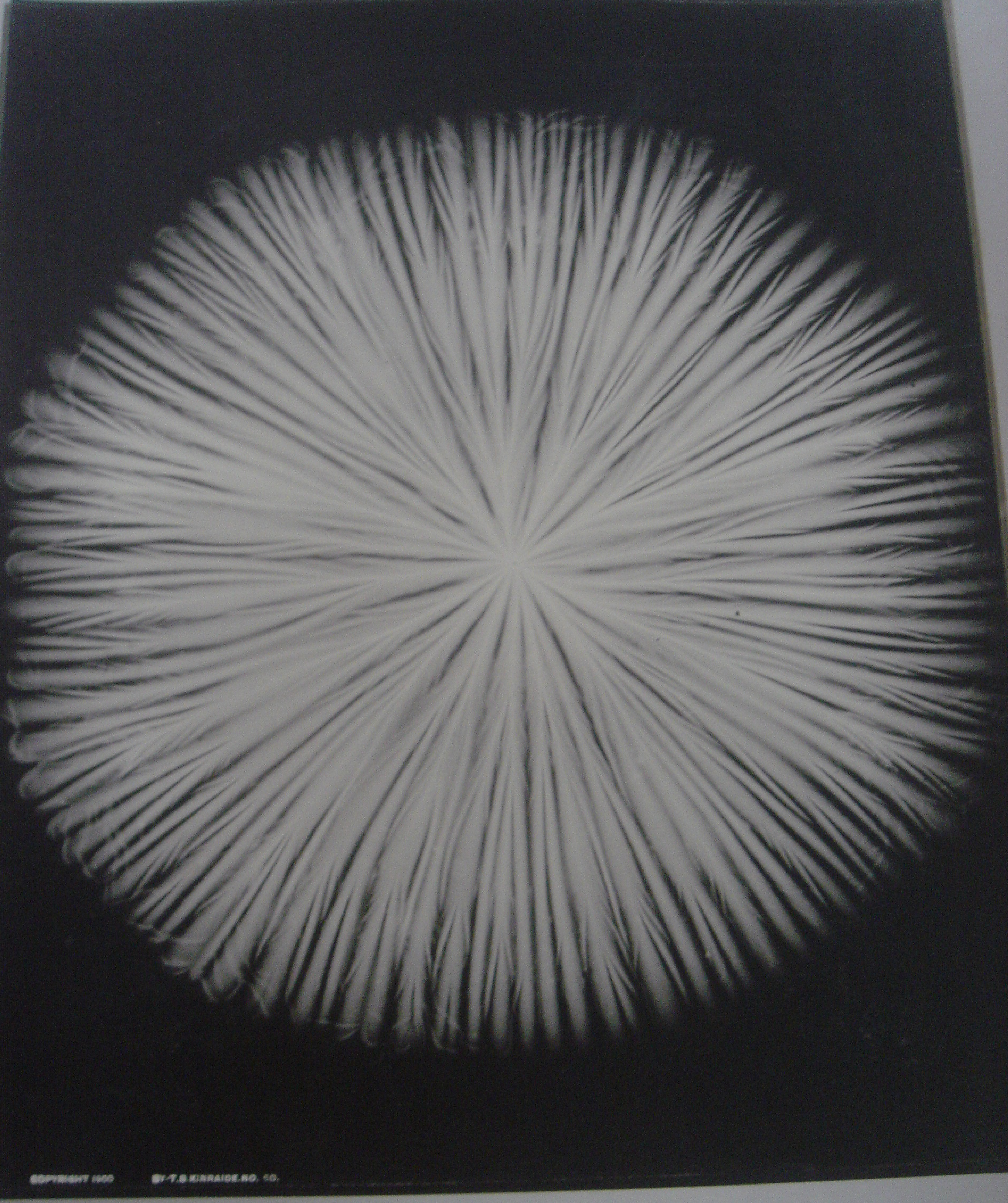
Condenser Series.



No. 48. COMPLEX ELECTRIC ENTITIES. (Enlarged)

Electric Entities obtained from a surface Electrically divided into a Positive and Negative area. The Plumous or Negative end of the Entity is formed on the Positive area. The Positive end forms on the Negative area. The narrow stem joining the two phases marks the line of division between the two areas.

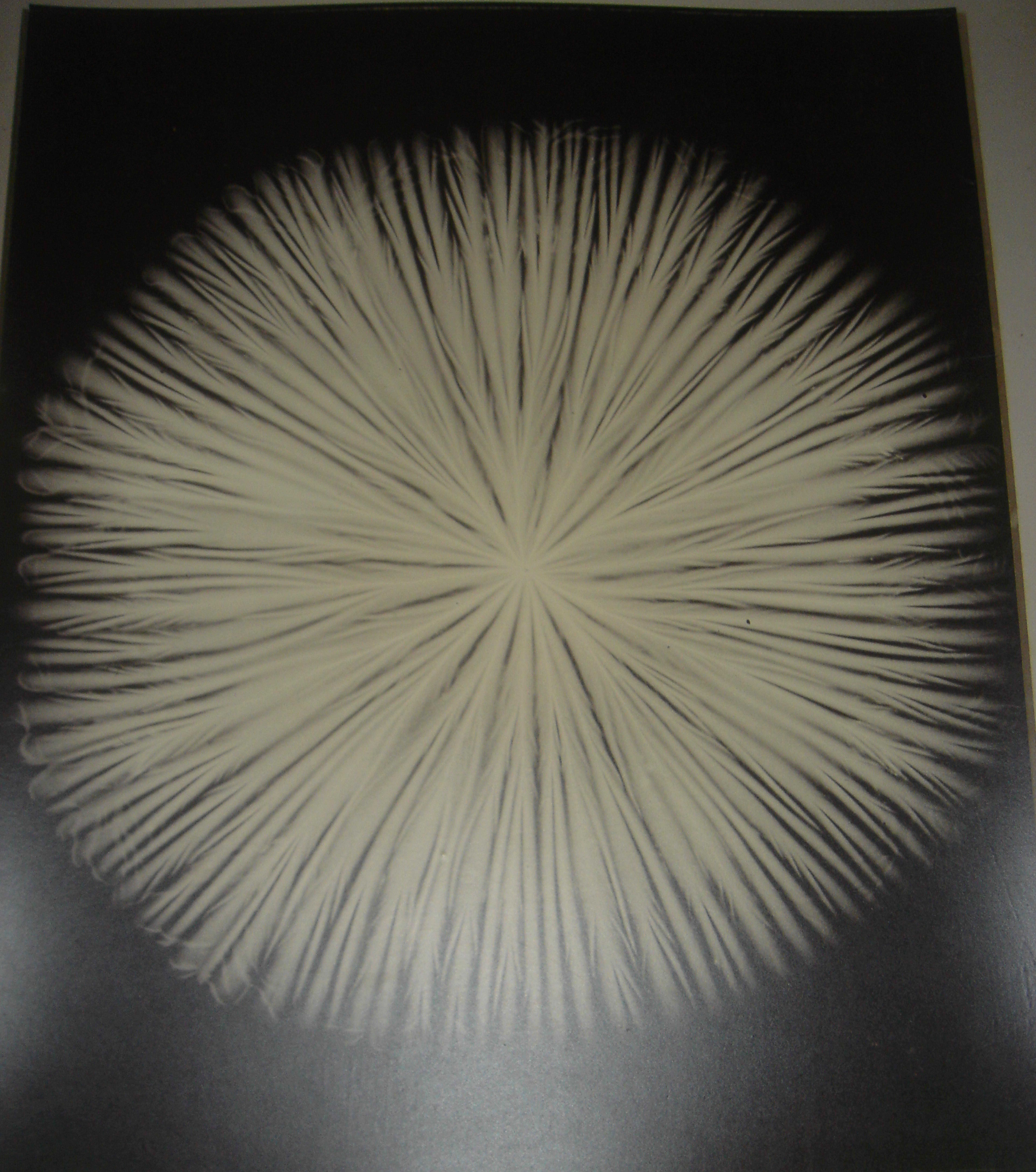
Condenser Series.


COPYRIGHT 1900 BY T. B. KINRAIDE, NO. 40.

No. 60. THE NEGATIVE PHASE OF ELECTRIC ENERGY. (Enlarged)

A transfer of Electric force from a surface not charged to a Negative point at the centre.

Condenser Series.

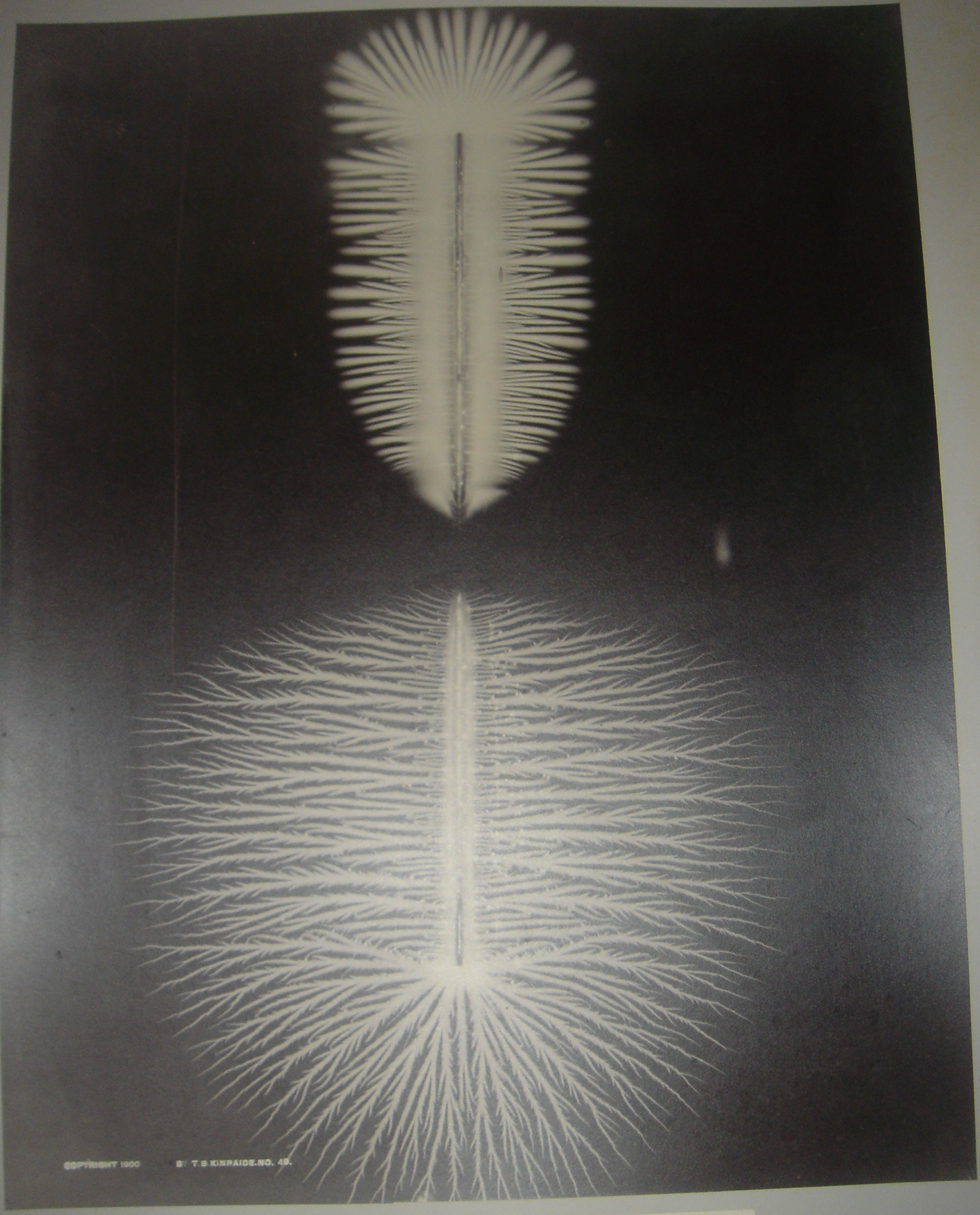


COPYRIGHT 1900 BY T. B. KINRAIDE. NO. 50.

No. 50. THE NEGATIVE PHASE OF ELECTRIC ENERGY. (Enlarged)

A transfer of Electric force from a surface not charged to a Negative point at the centre.

Condenser Series.

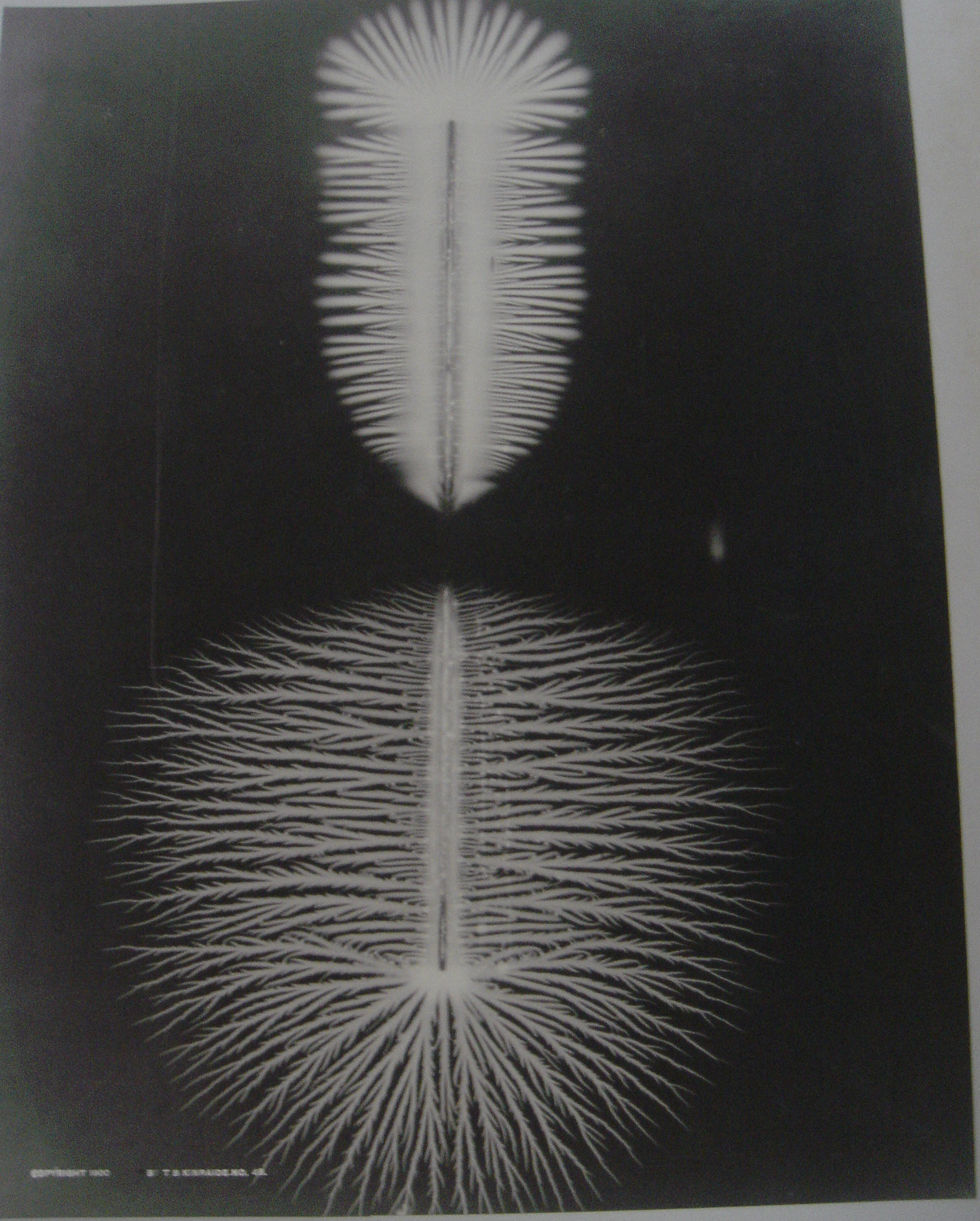


COPYRIGHT 1900 BY T. S. KINRAIDE. NO. 49.

No. 51. [illegible] (Enlarged)

OF ELECTRIC [illegible]

Condenser Series.



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No. 51. OF ELECTRIC (Enlarged)

Condenser Series.

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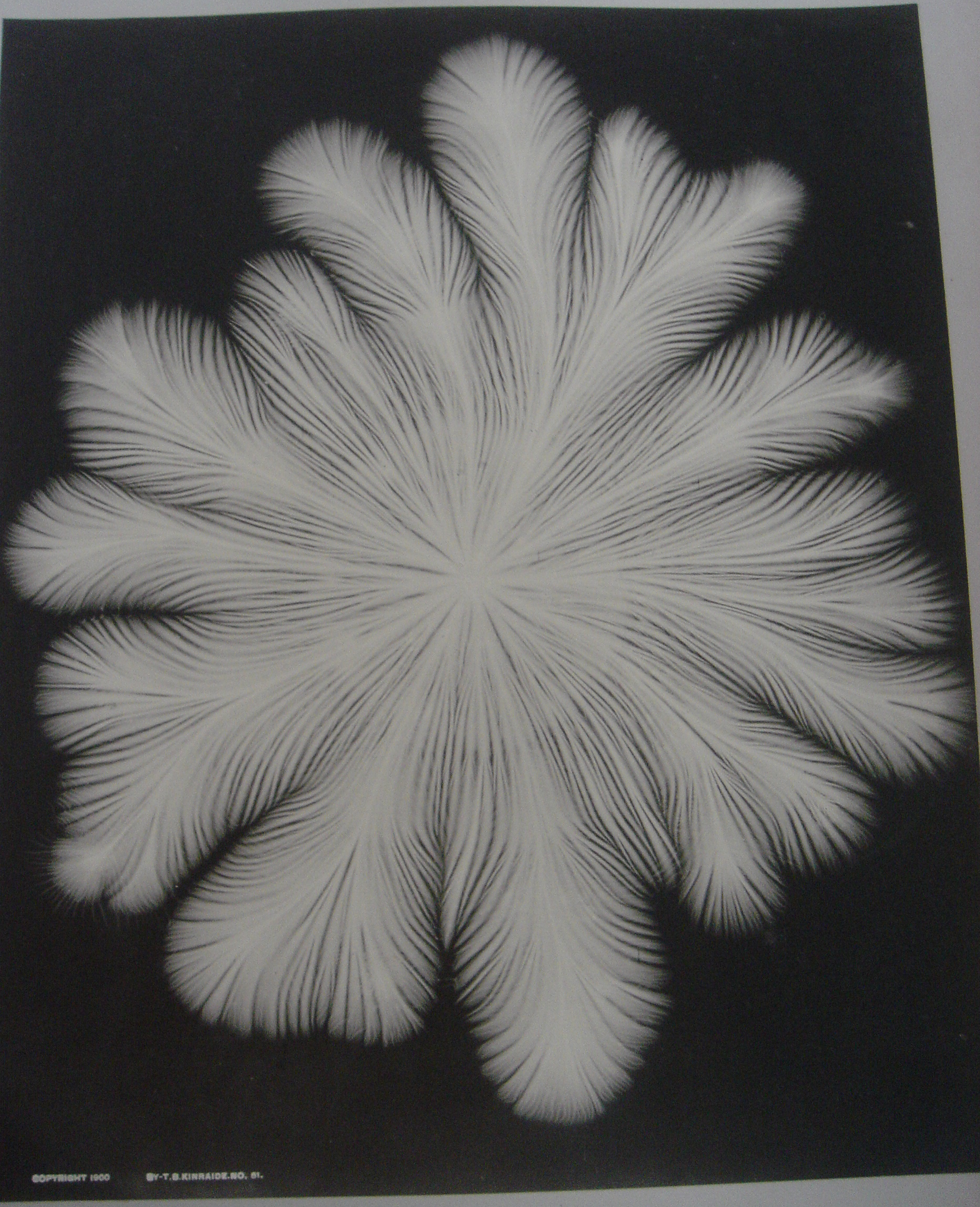

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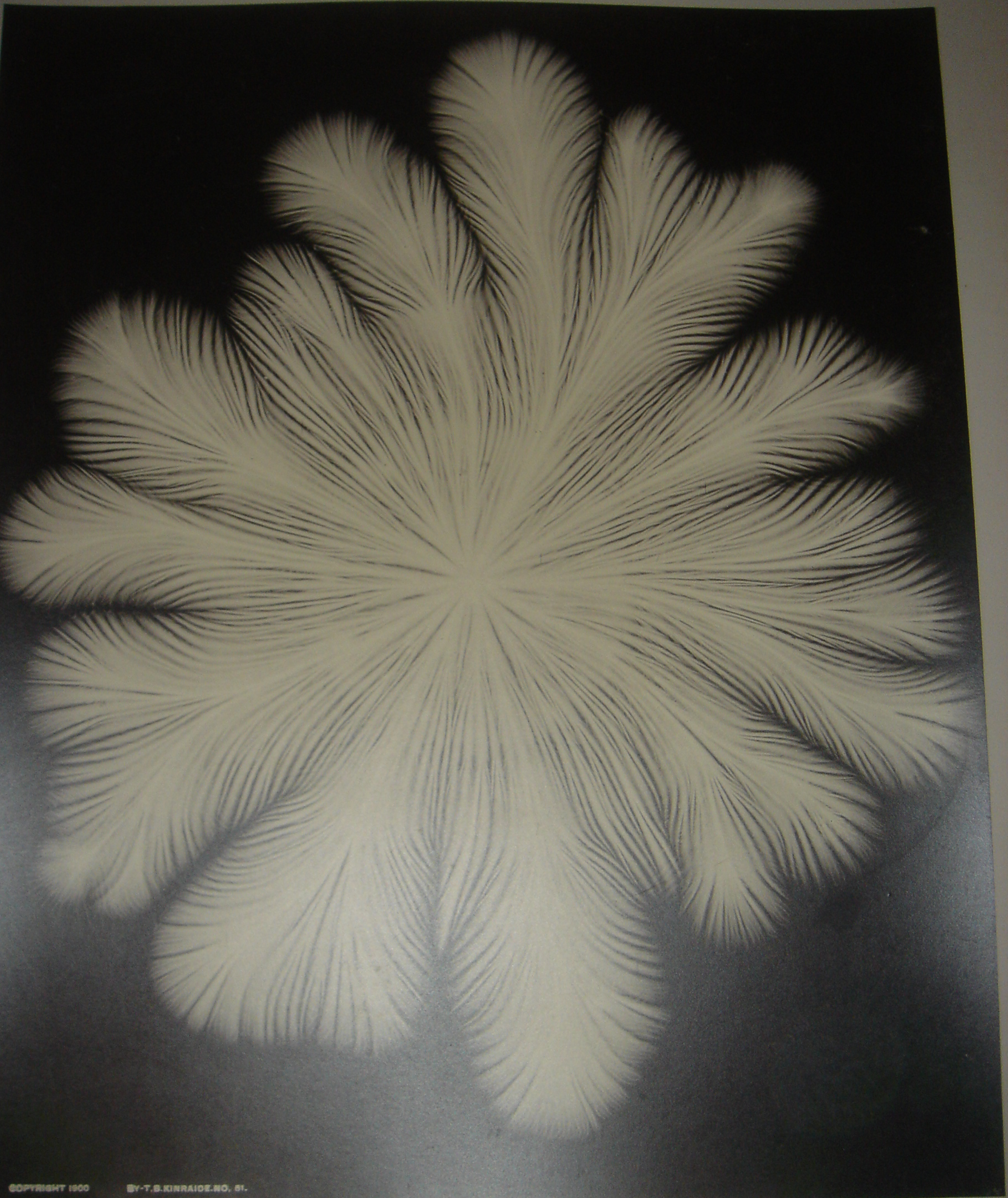
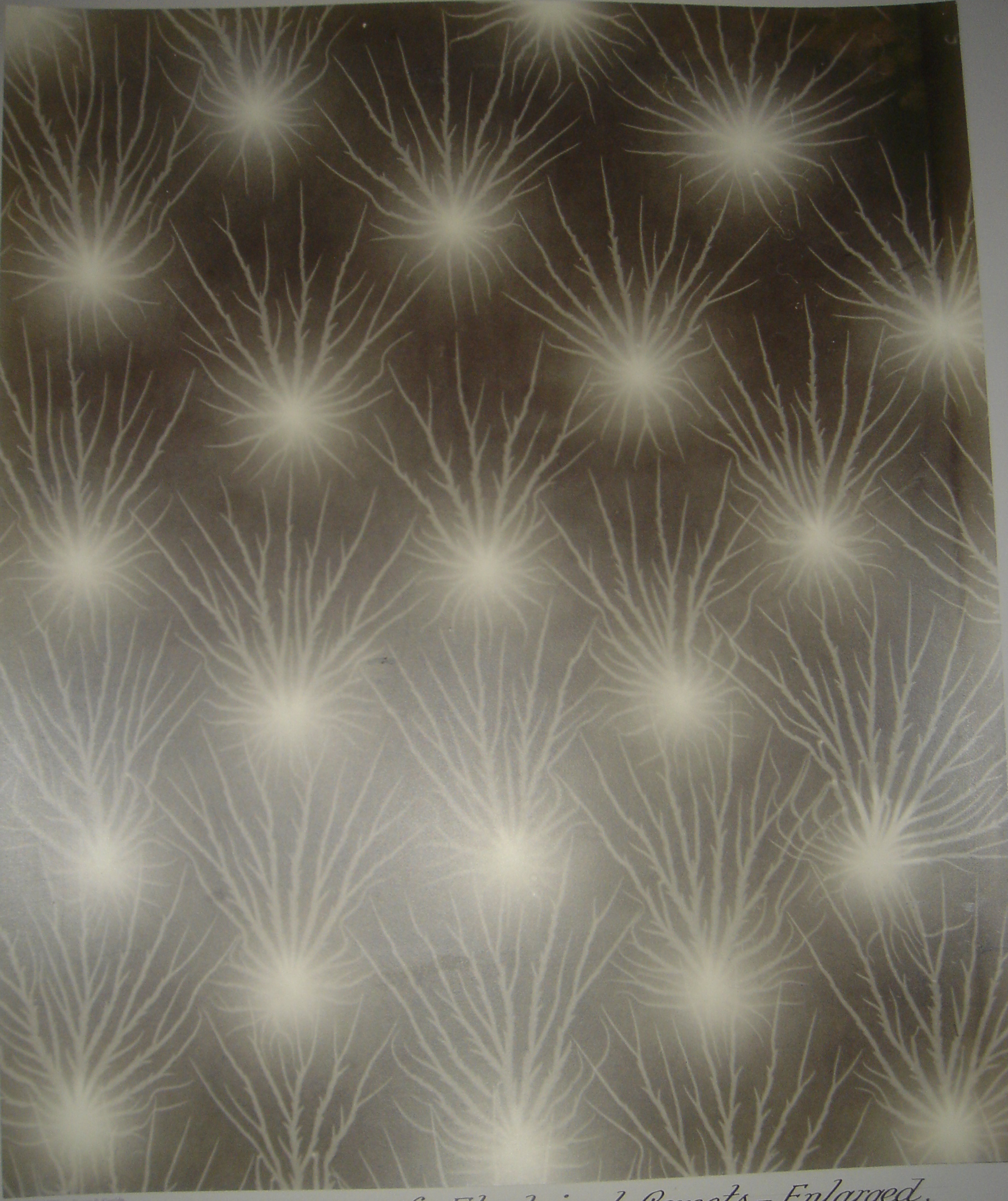


COPYRIGHT 1900 BY-T.B.KINRAIDE.NO. 51.



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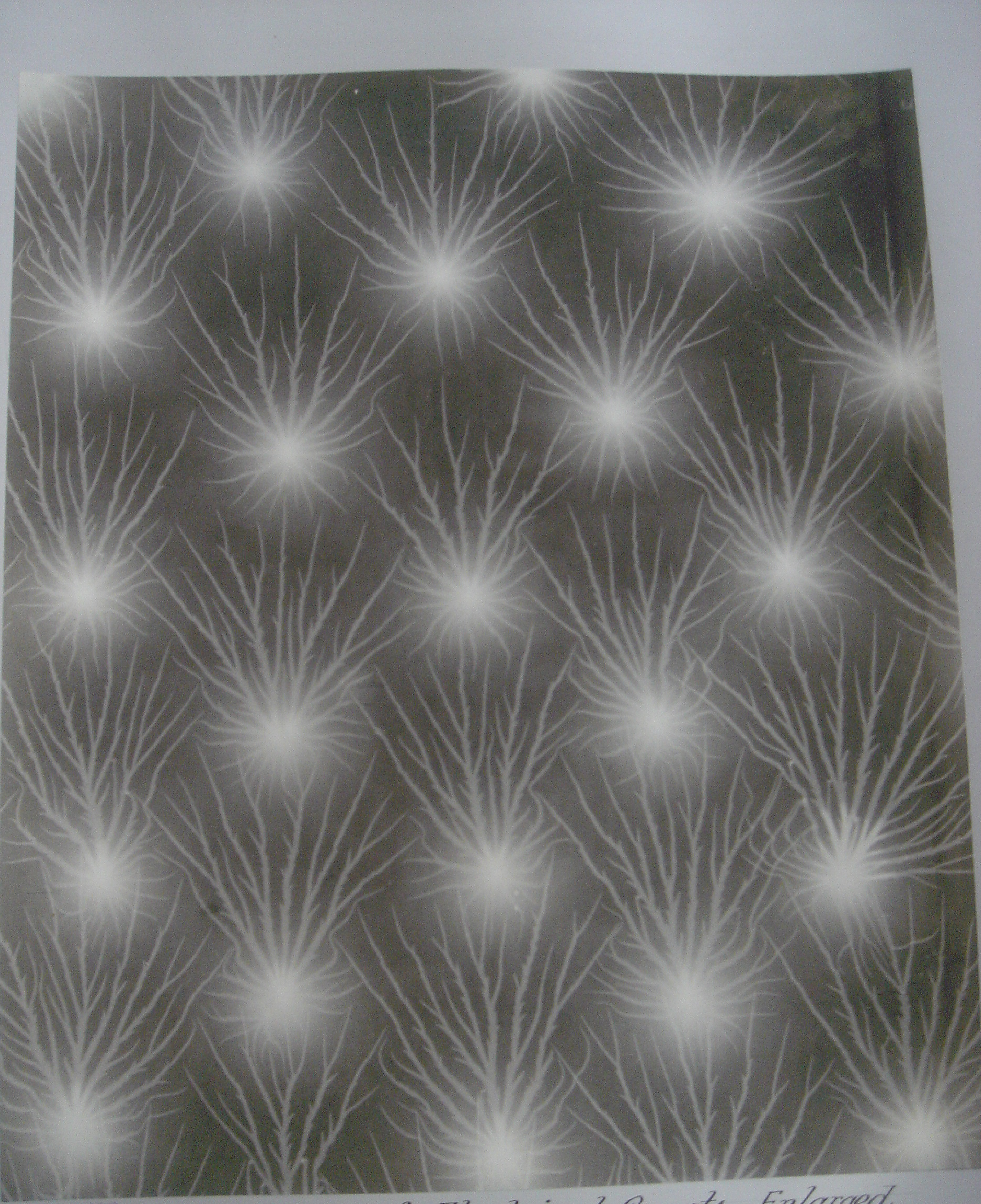
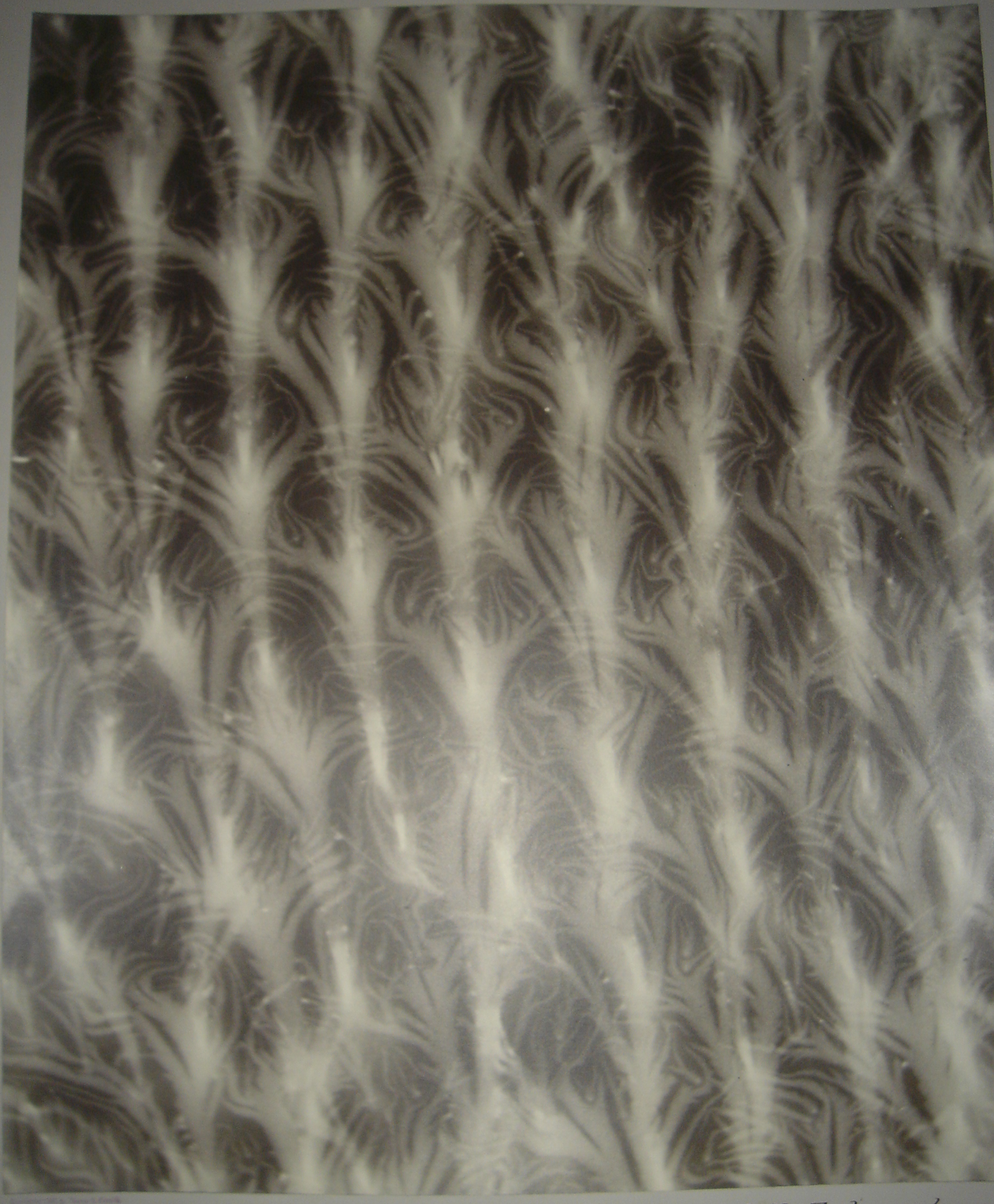
Negative End of Electrical Comets.- Enlarged.



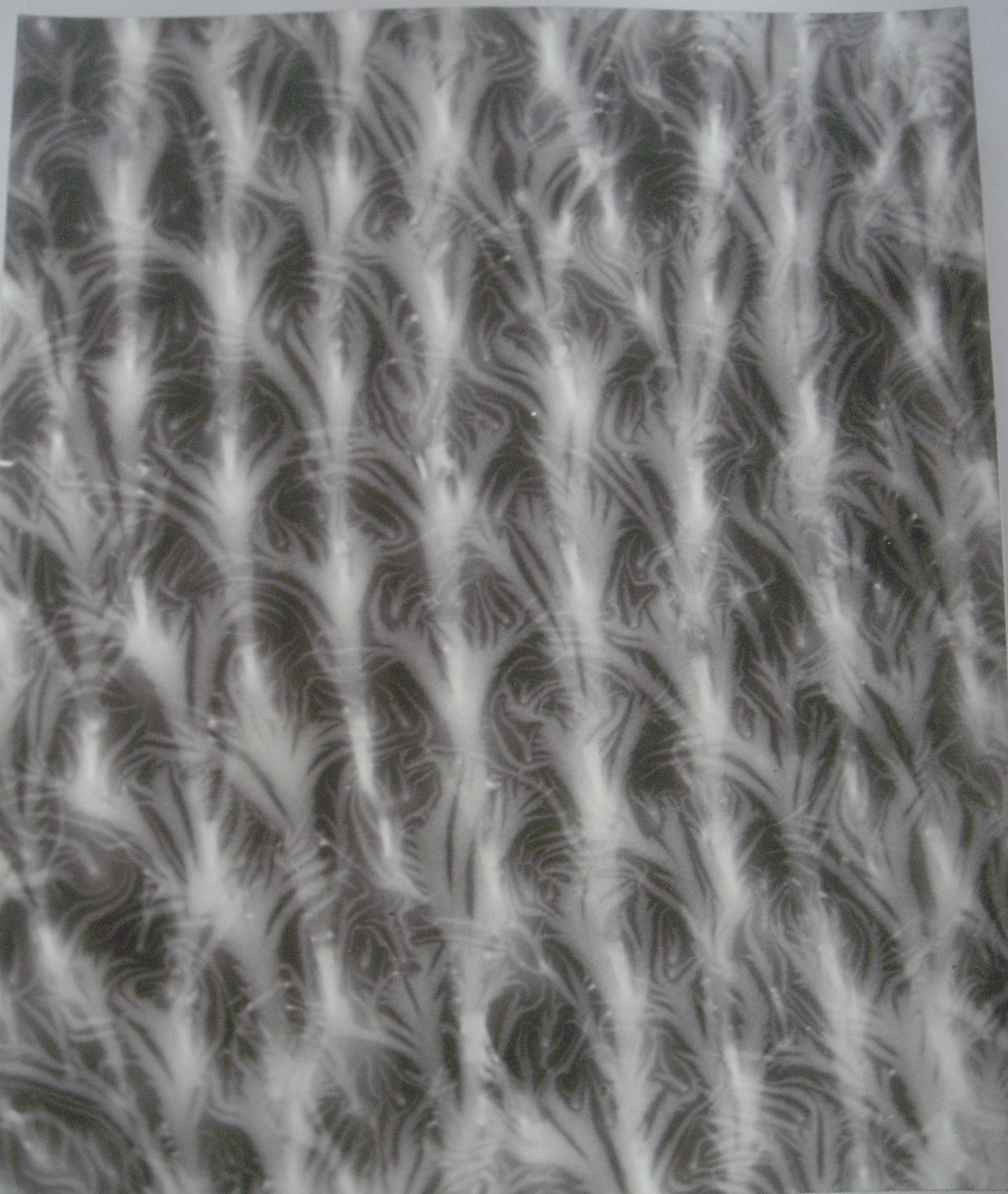
[illegible]

Negative End of Electrical Comets.- Enlarged.

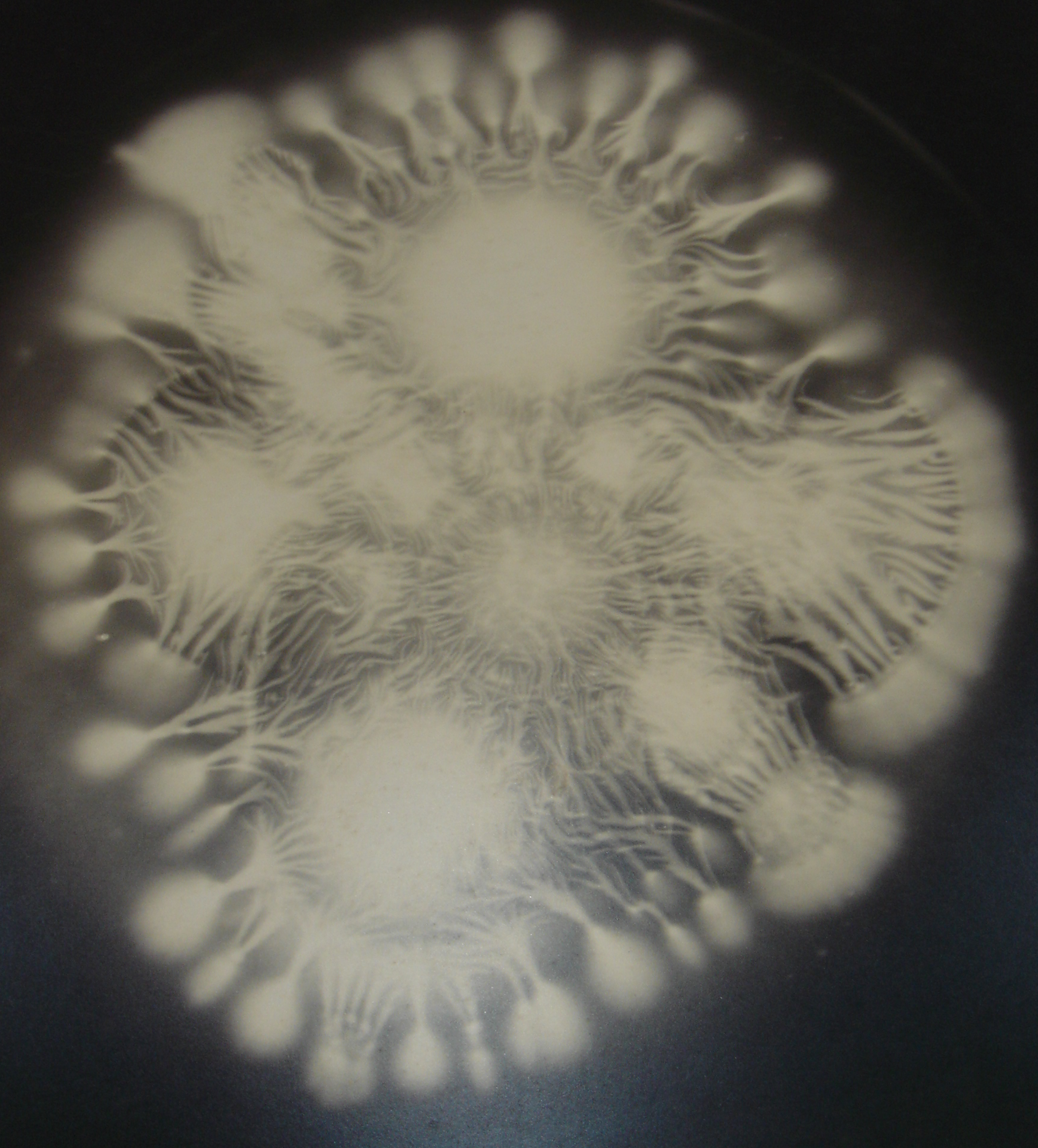


[illegible]

Electric Comets in series and paralell.-Enlarged.



Electric Comets in series and paralell.-Enlarged.



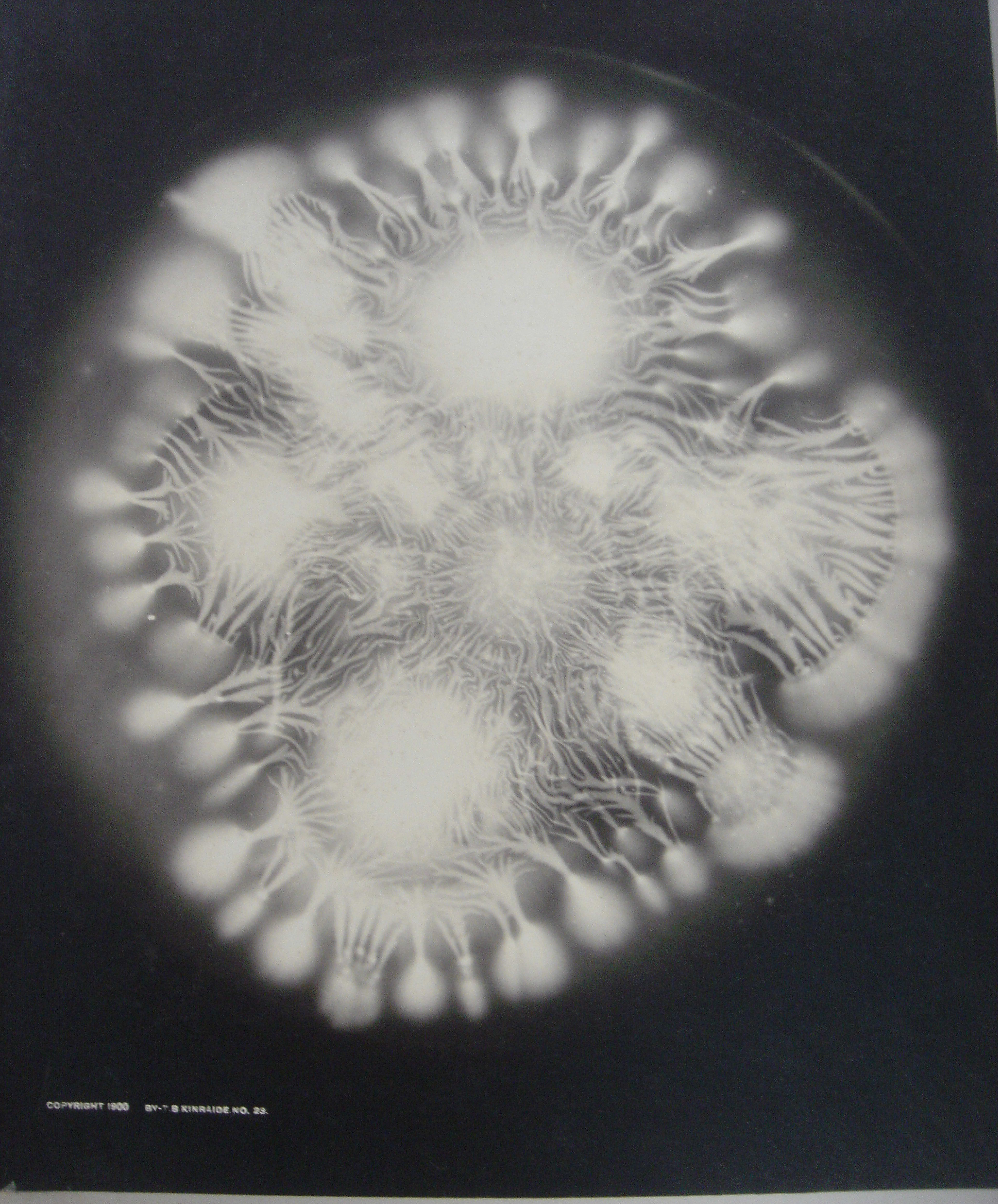
COPYRIGHT 1900 BY T. B. KINRAIDE NO. 23.

No. 23. PRIMARY ENTITIES OF ELECTRICITY. (Enlarged)

See No. 14.

Discharge of Electricity through a two inch sphere placed upon a photograph plate laid film side down upon a positively charged uncoated condenser surface. The phenomena of the two phases of Electricity in series between condenser surfaces.

Condenser Series.

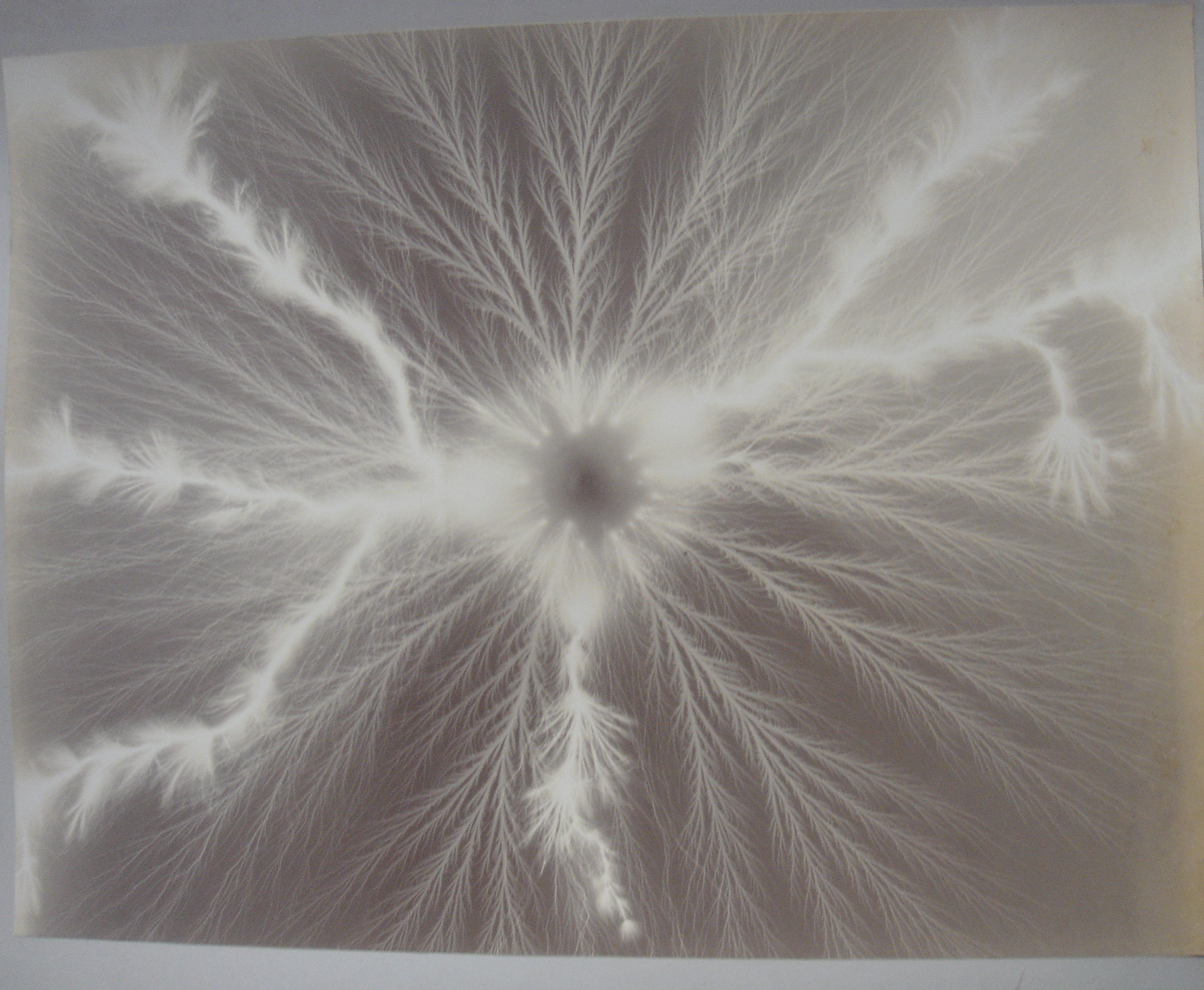

COPYRIGHT 1900 BY T. B. KINRAIDE. NO. 23.

No. 23. **PRIMARY ENTITIES OF ELECTRICITY.** (Enlarged)

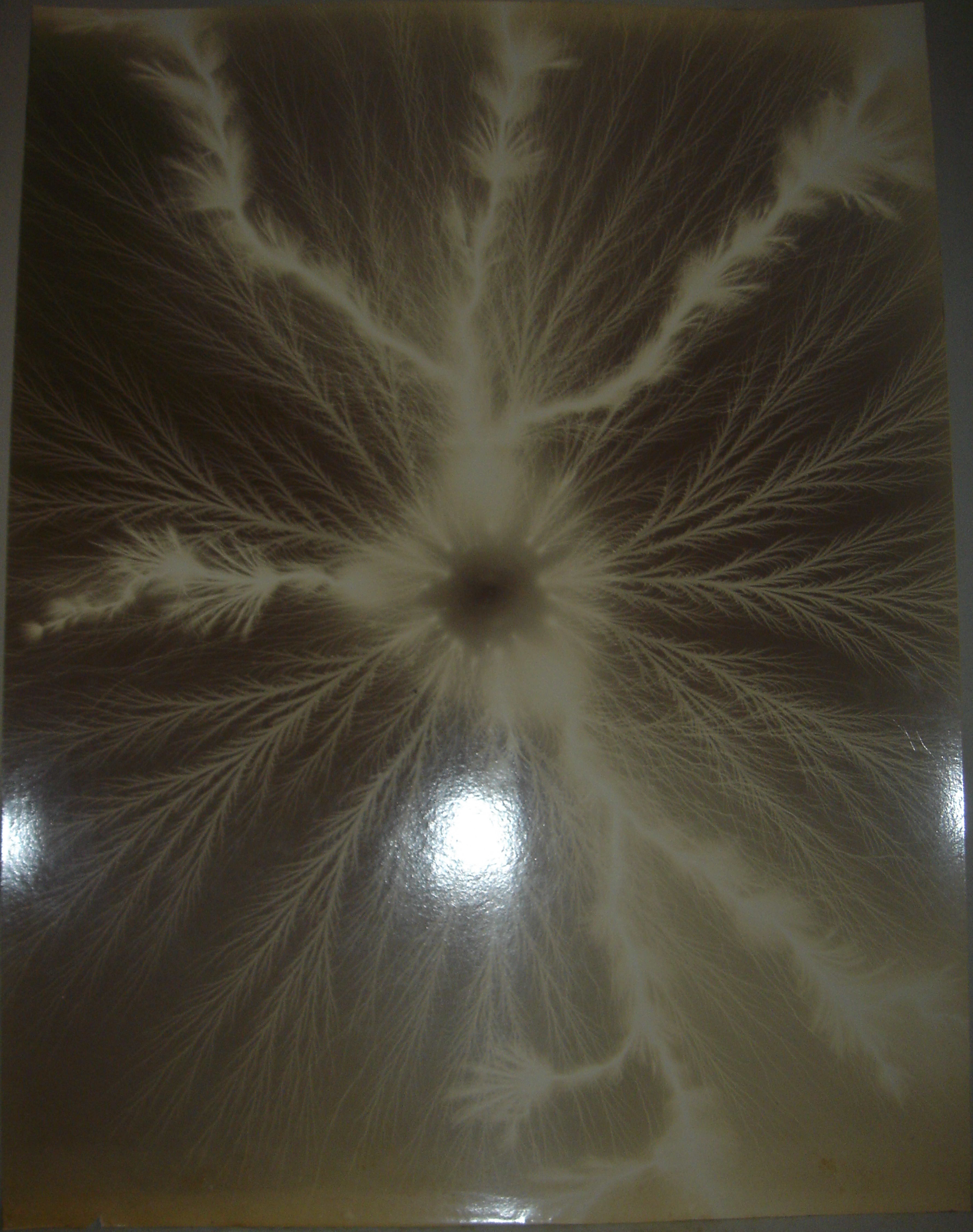
See No. 14.

Discharge of Electricity through a two inch sphere placed upon a photograph plate laid film side down upon a positively charged unexcited condenser surface. The phenomena of the two phases of Electricity in series between condenser surfaces.

Condenser Series.



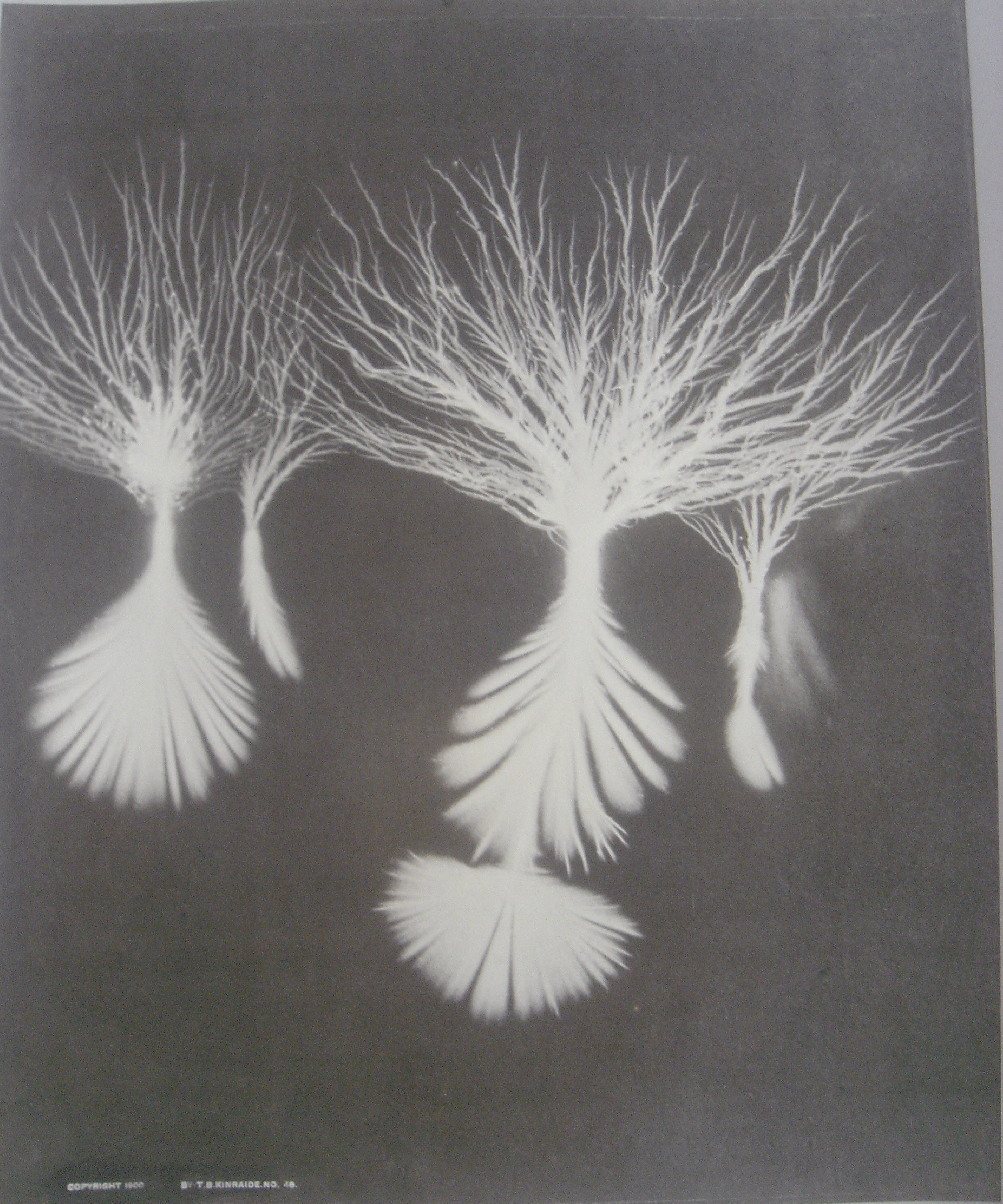
No. 42. **Autograph of the Positive and Negative Phases of Electricity.** Enlarged.



No. 42. **Autograph of the Positive and Negative Phases of Electricity.** (Enlarged)

A discharge of Electricity over a normal condenser surface towards the edge of a disk placed upon the film side of a photograph plate producing the Negative phase. The superimposed Positive phase resulted from the return discharge of the force back over the plate from the edge of the disk.

[illegible] Series.



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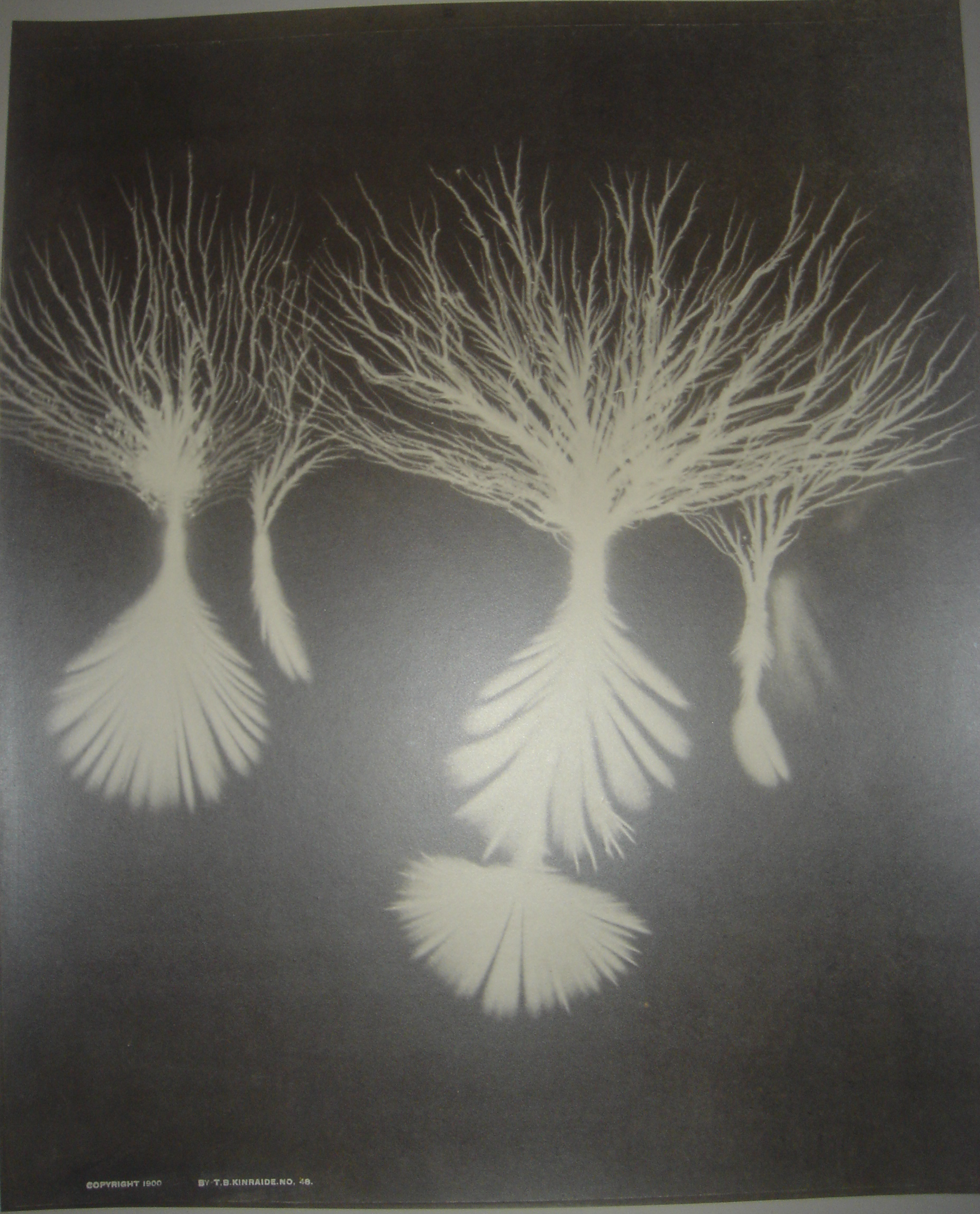

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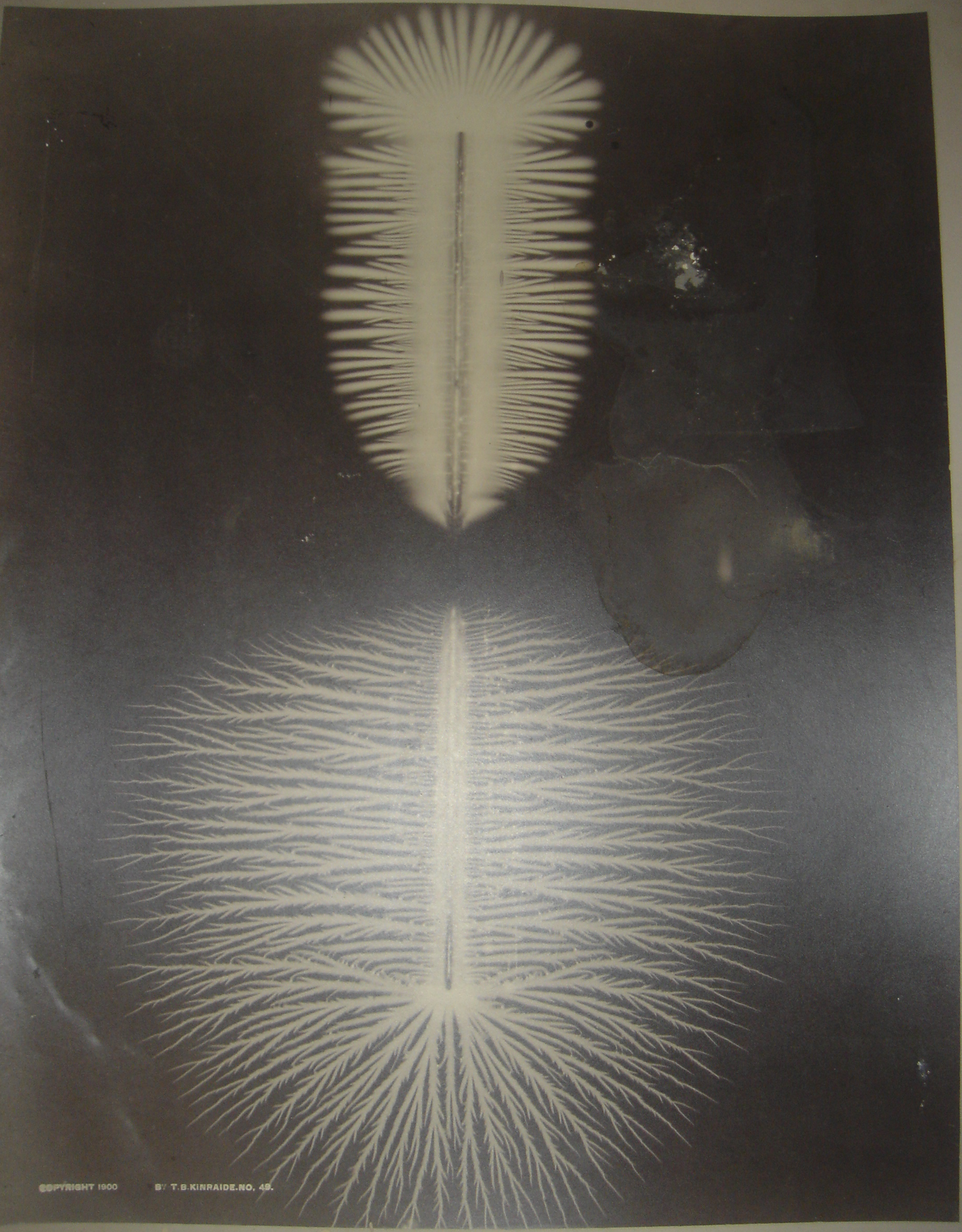

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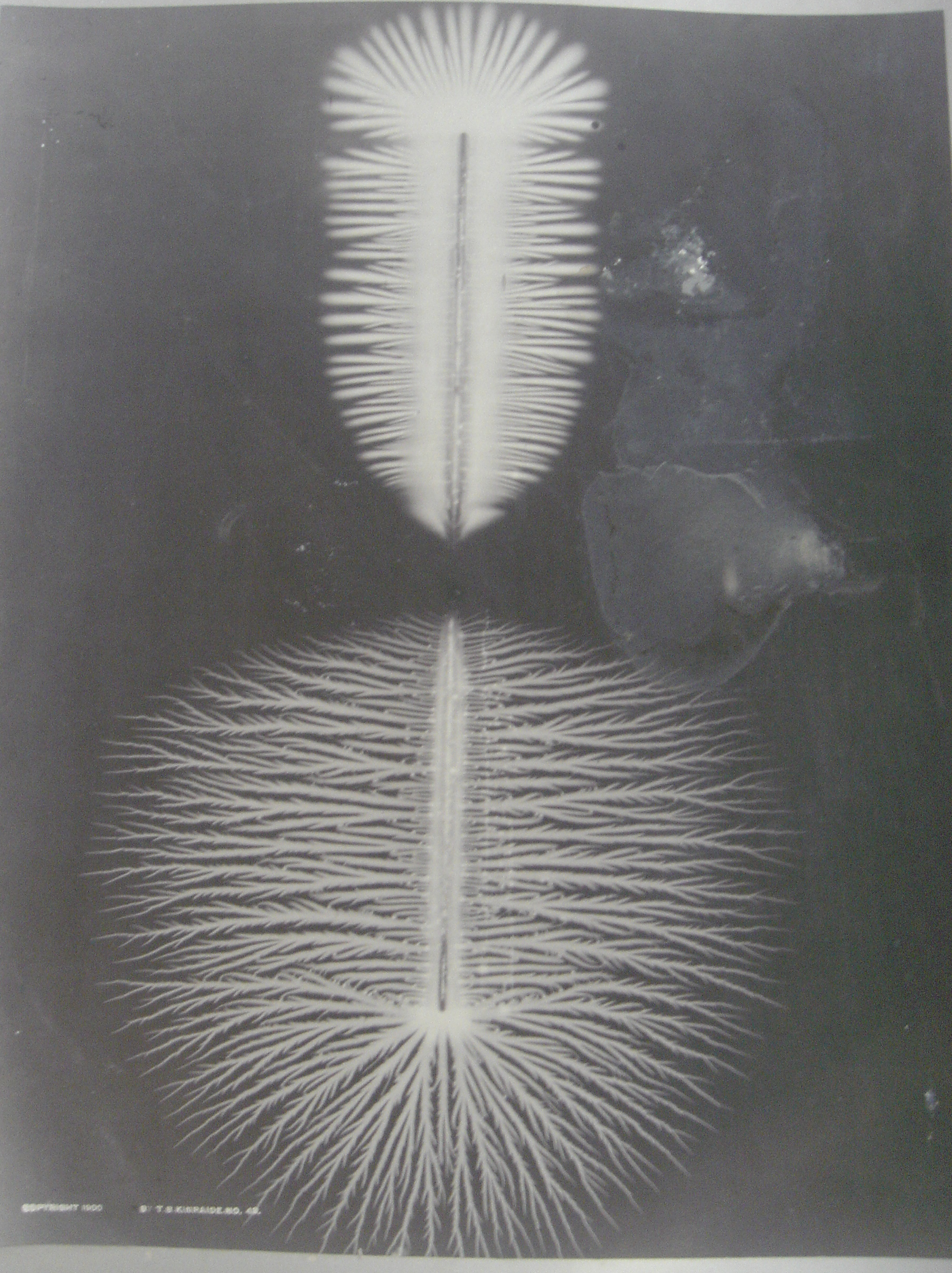

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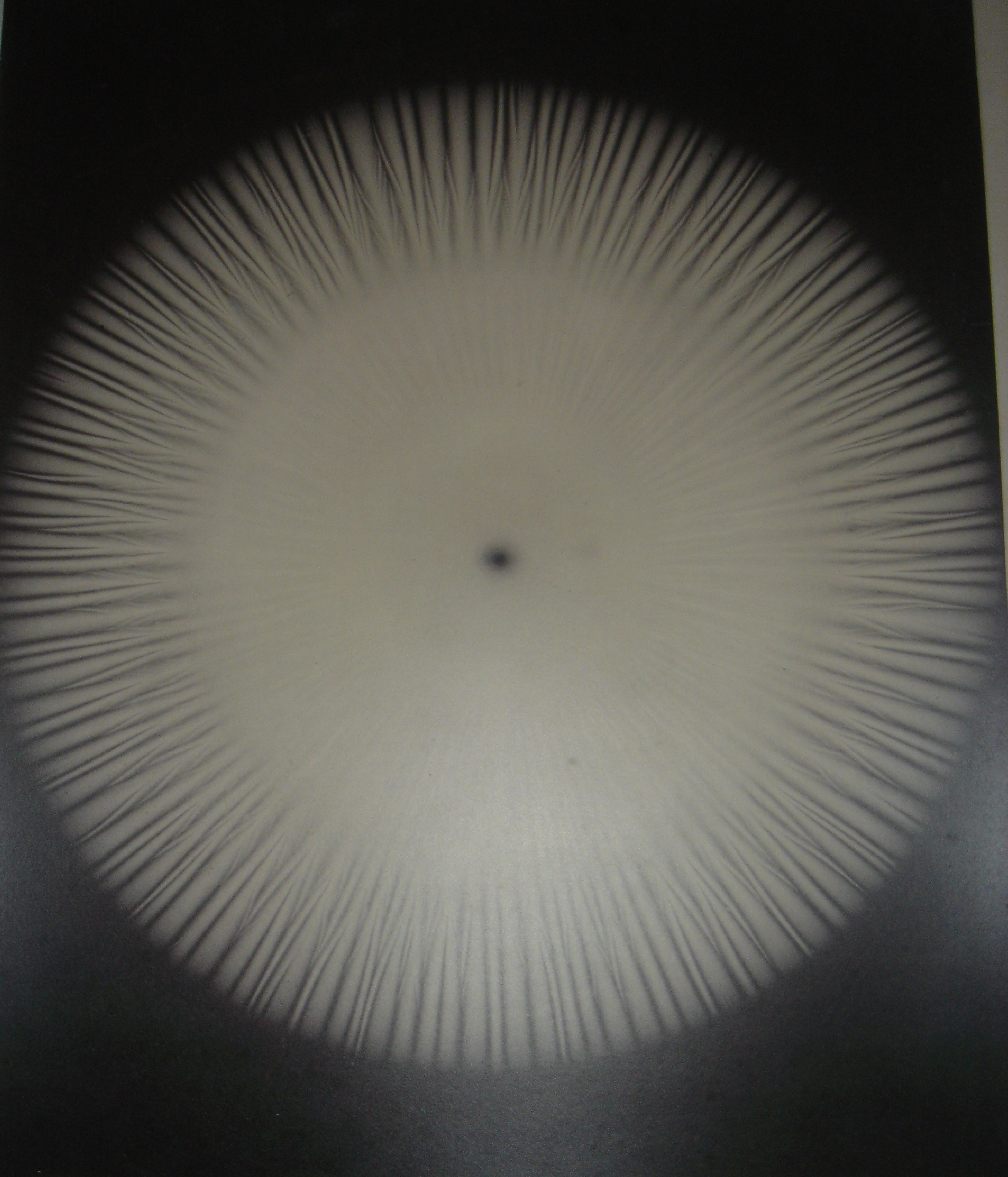


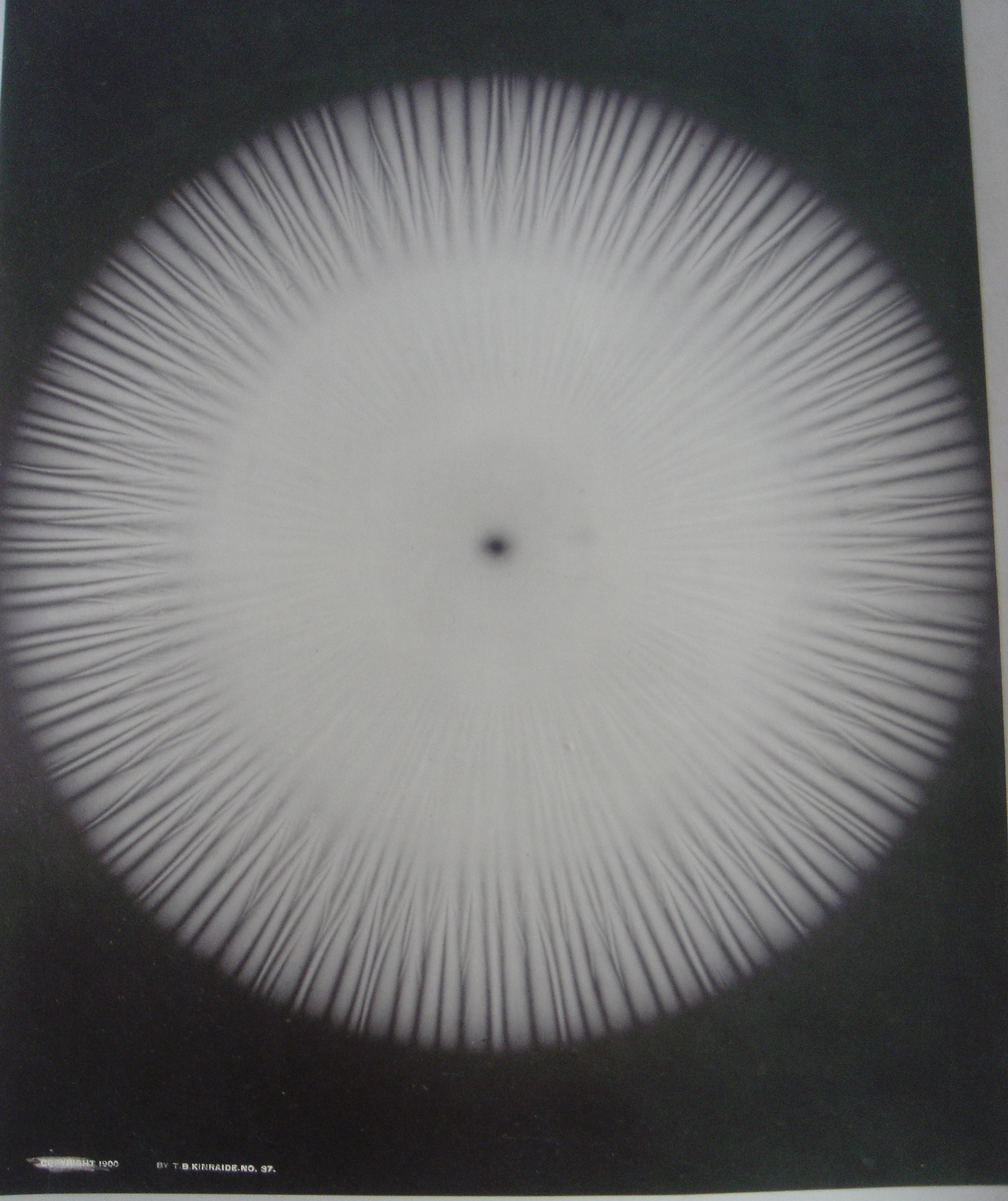
COPYRIGHT 1900 BY T. B. KINRAIDE. NO. 37.

No. 49. CO[illegible] T[illegible] (Enlarged)

Pr[illegible]d by placing [illegible] metal [illegible] the [illegible] charged [illegible]

[illegible] trav[illegible]ely charged surface [illegible] from [illegible] rod over a neg[illegible]ively charged surf[illegible]

Concentric Series.



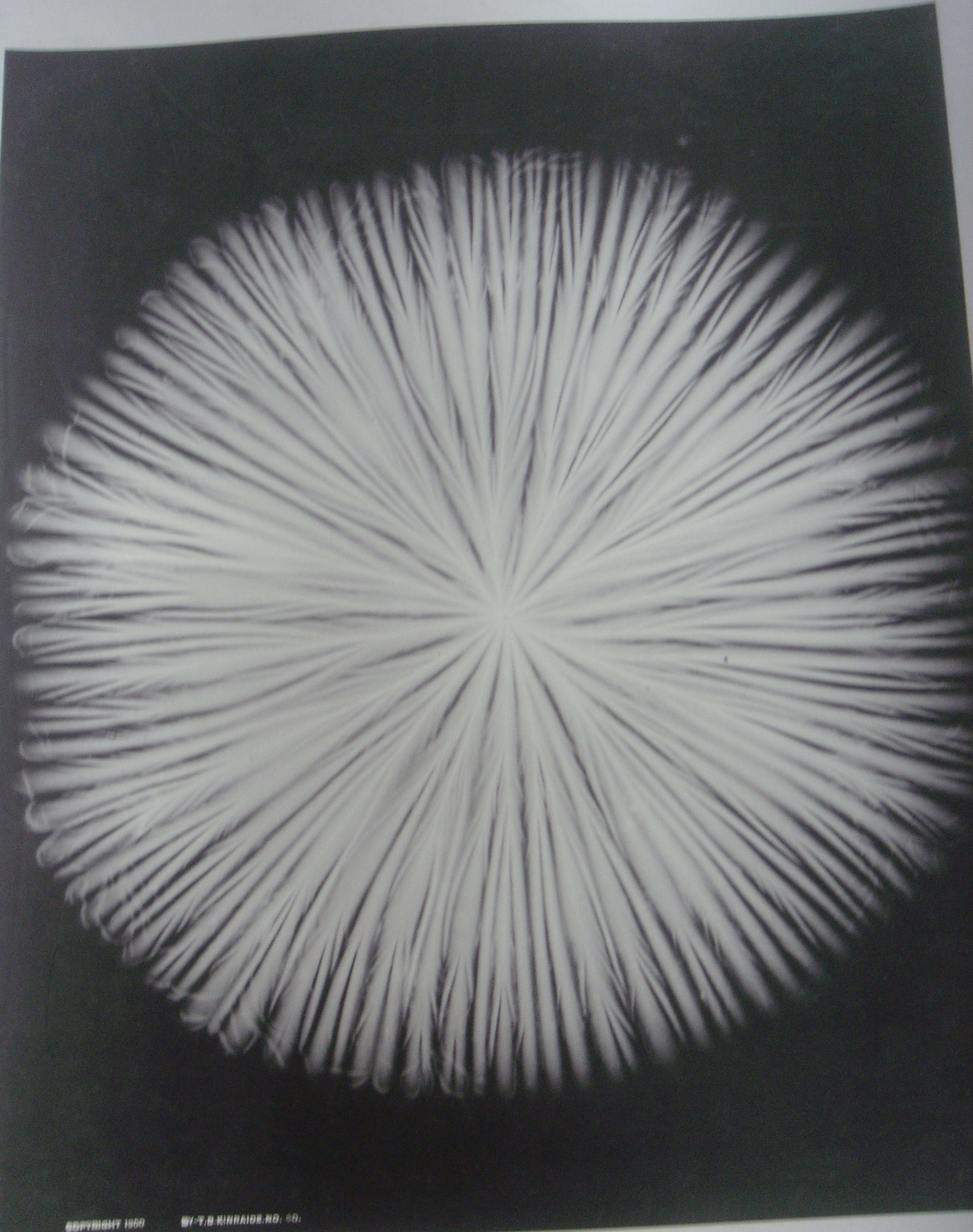
COPYRIGHT 1900 BY T.B.KINRAIDE.NO, 37.

No. 49. [illegible] CO[illegible] TH[illegible] (Enlarged)

P[illegible]d by placing [illegible] charged [illegible]

[illegible] on th[illegible]vely charged surface [illegible] rod

over a neg[illegible]tively charged sur[illegible] *Consumer Series.*



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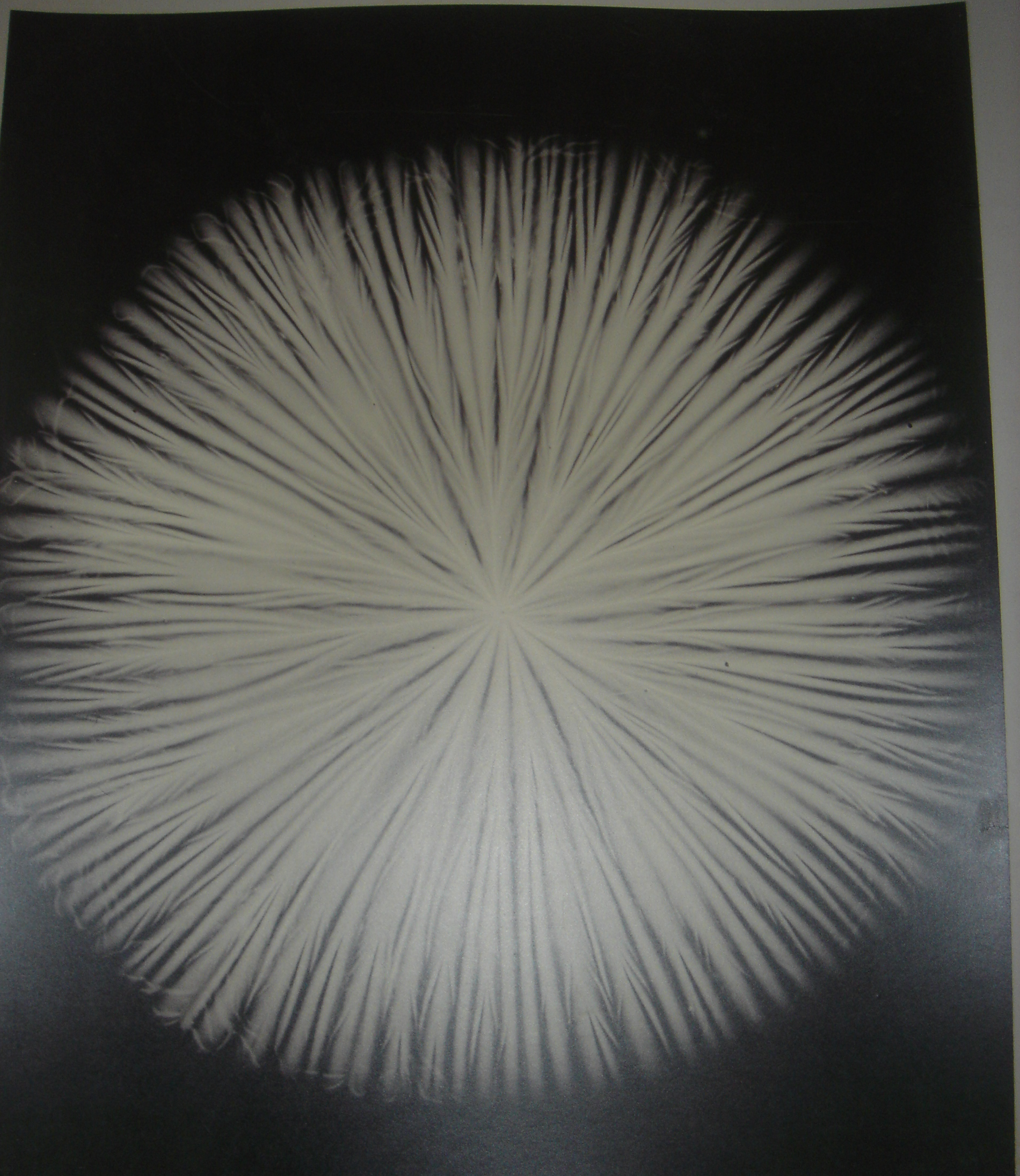
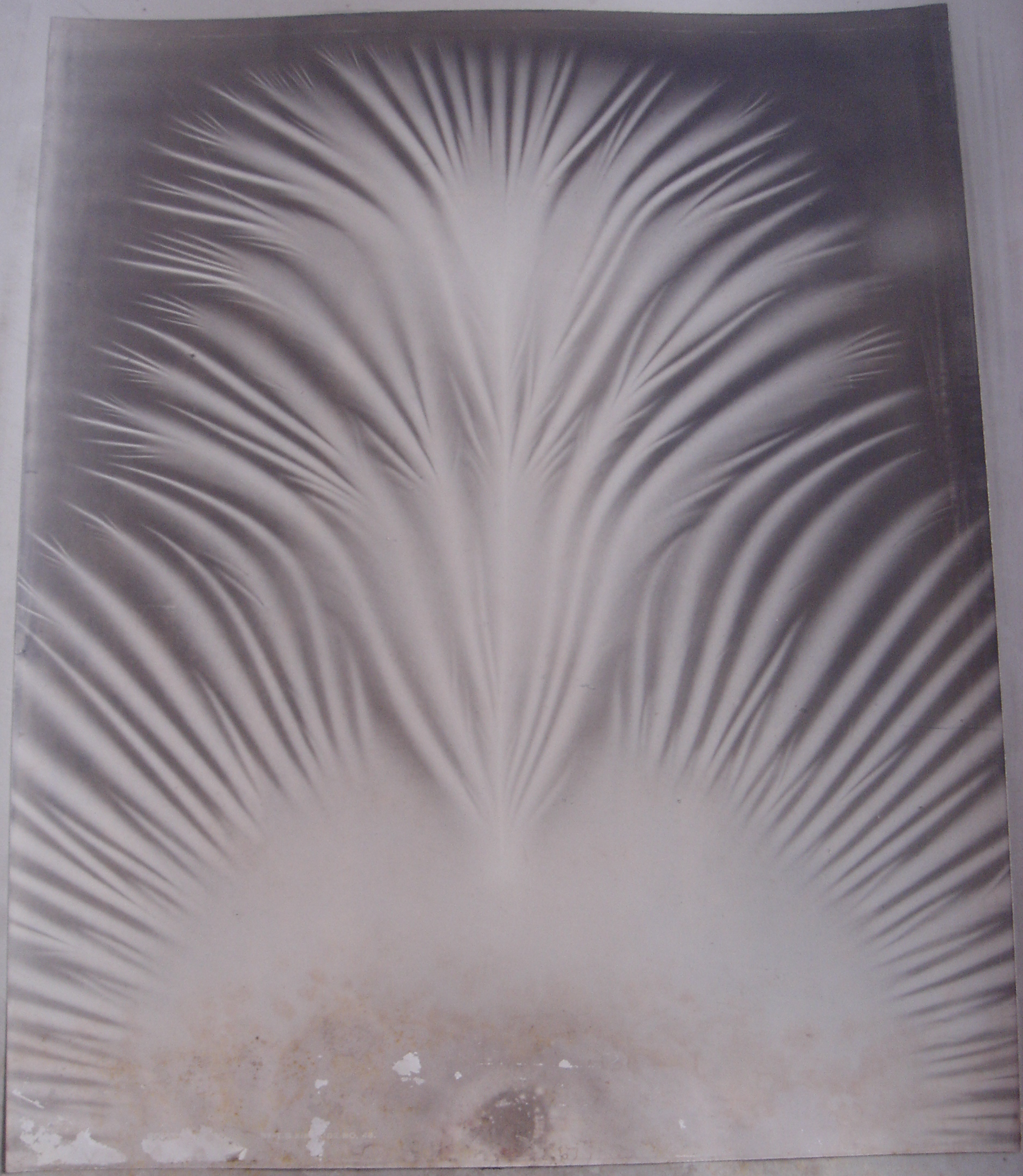


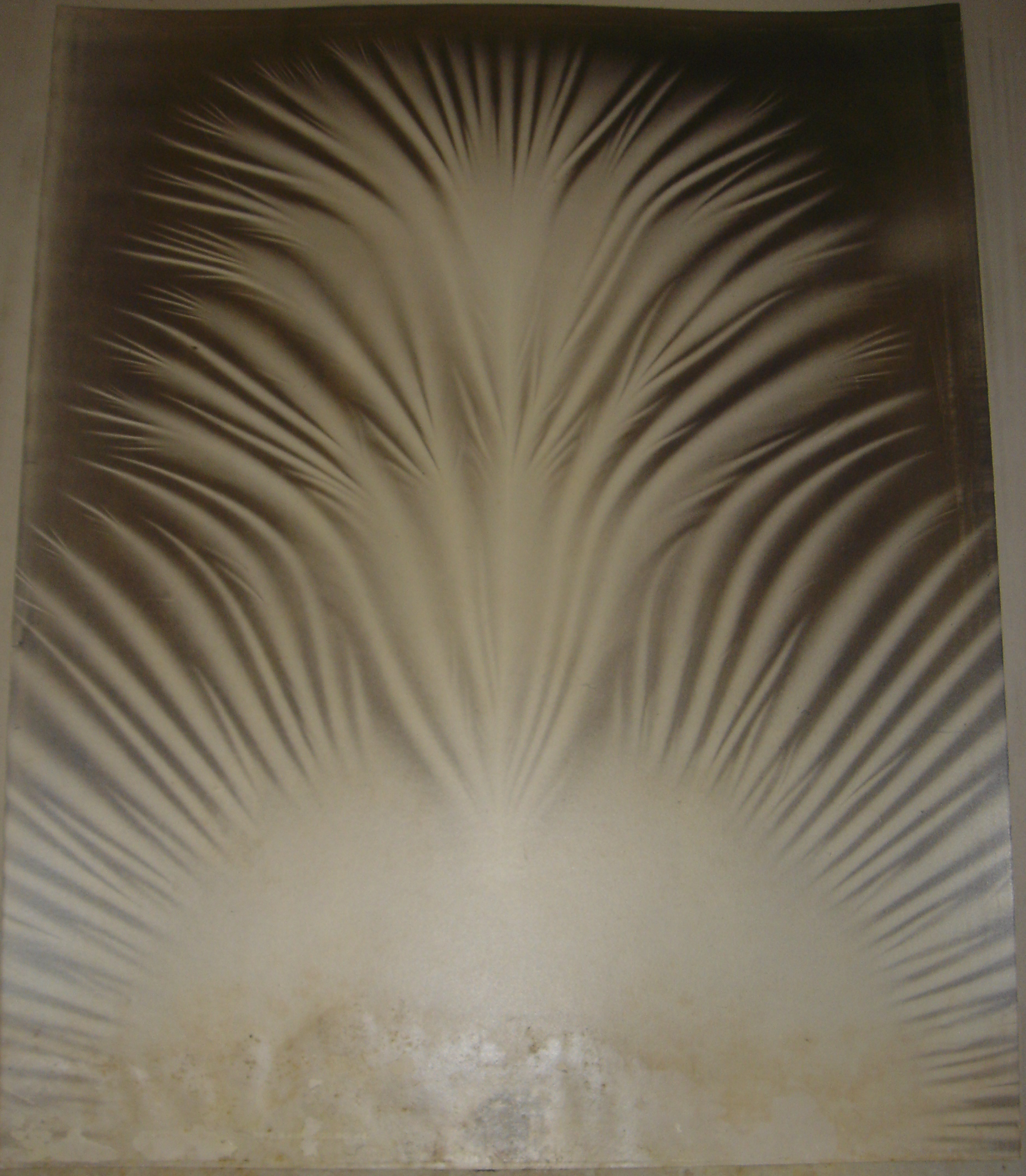
COPYRIGHT 1900 BY-T.B.KINRAIDE.NO. 50.



lectricity changes to STU
of Electricity

THE NEGATIVE PHASE OF
ELECTRICITY.

(Enlarged)



[illegible] STU[illegible] THE NEGATIVE PHASE OF ELECTRICITY. (Enlarged) [illegible]

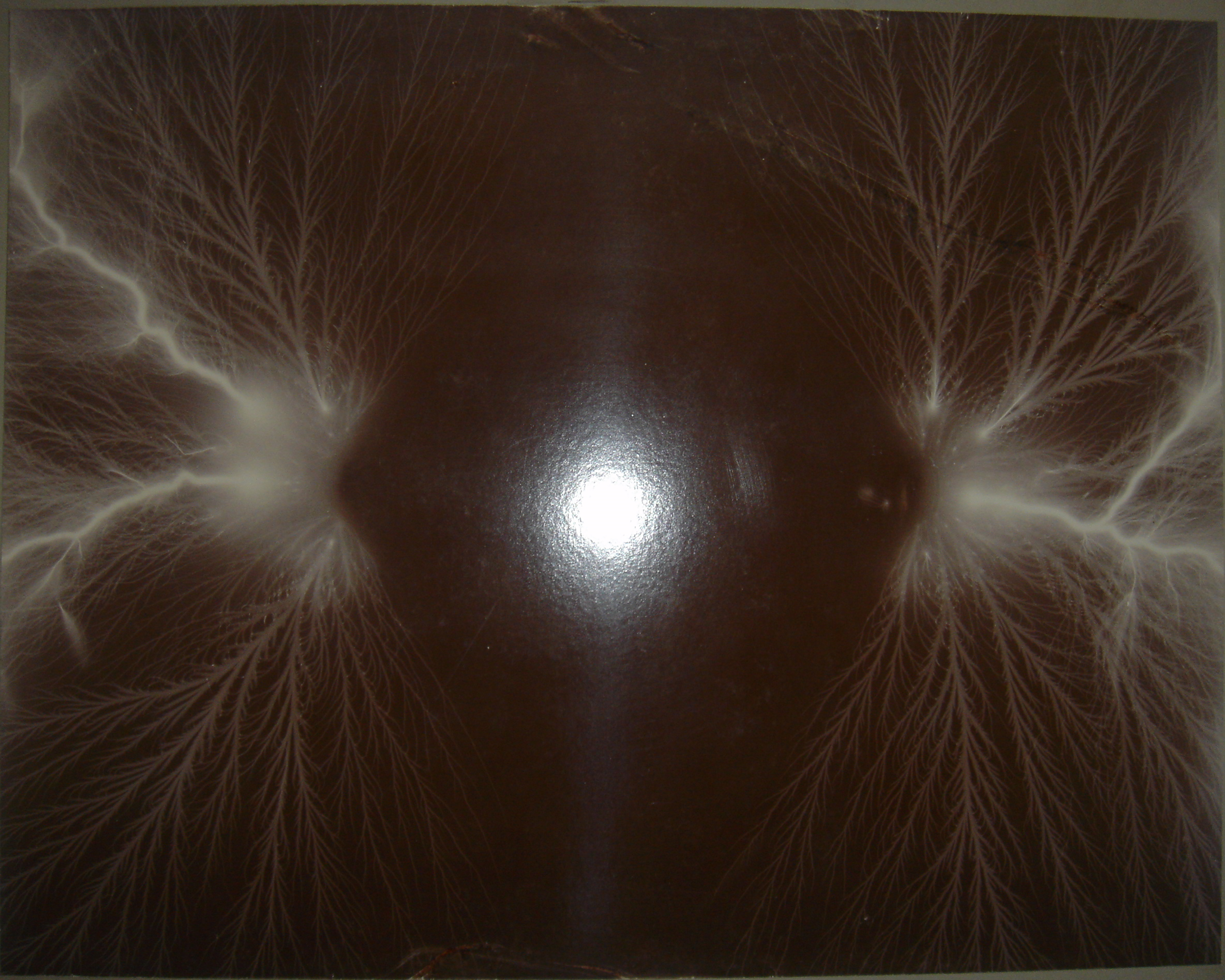
T.B.KIN DS.NO. 48.

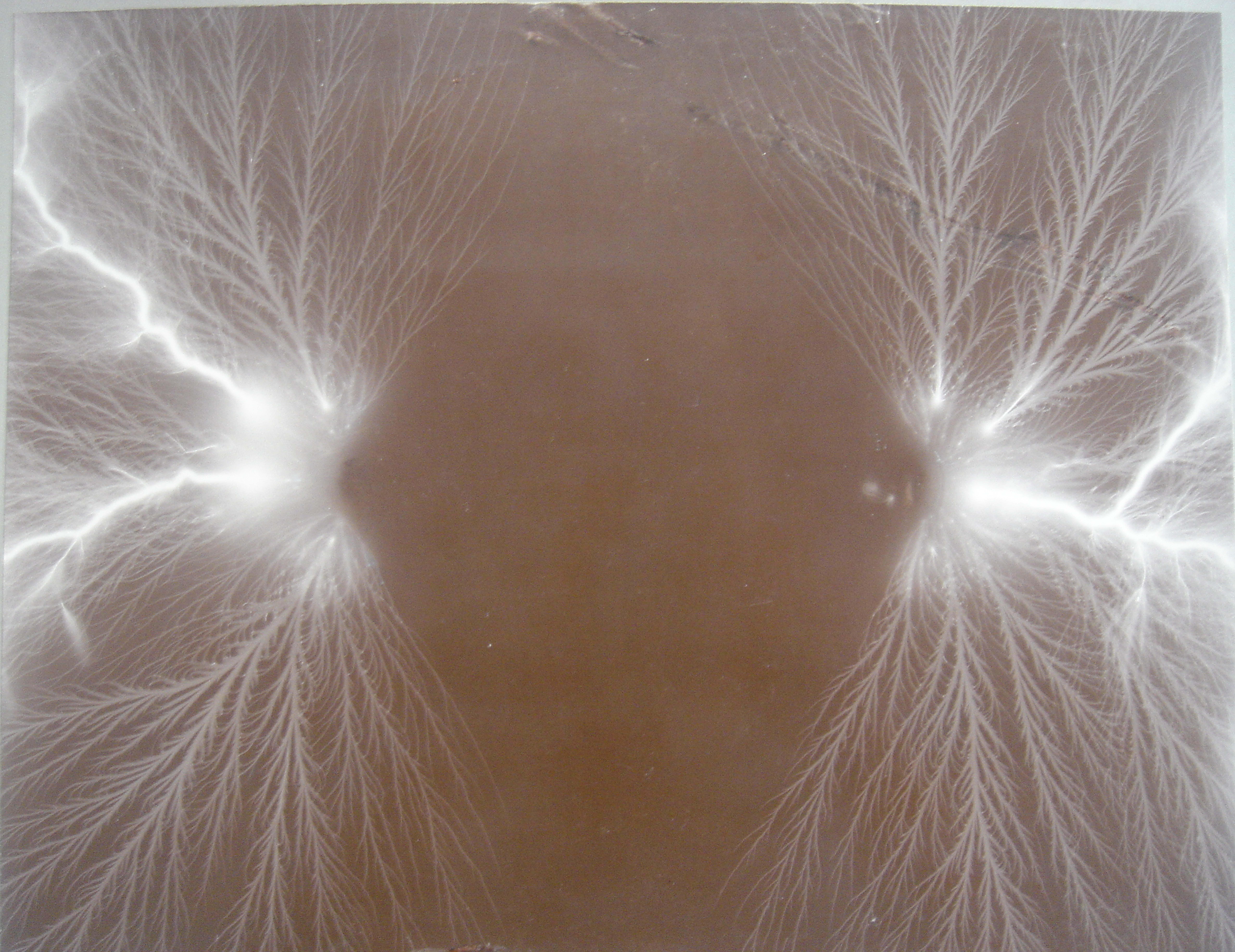
Law o HE NEGATIVE PHASE OF ELECTRICITY. (Enlarged)

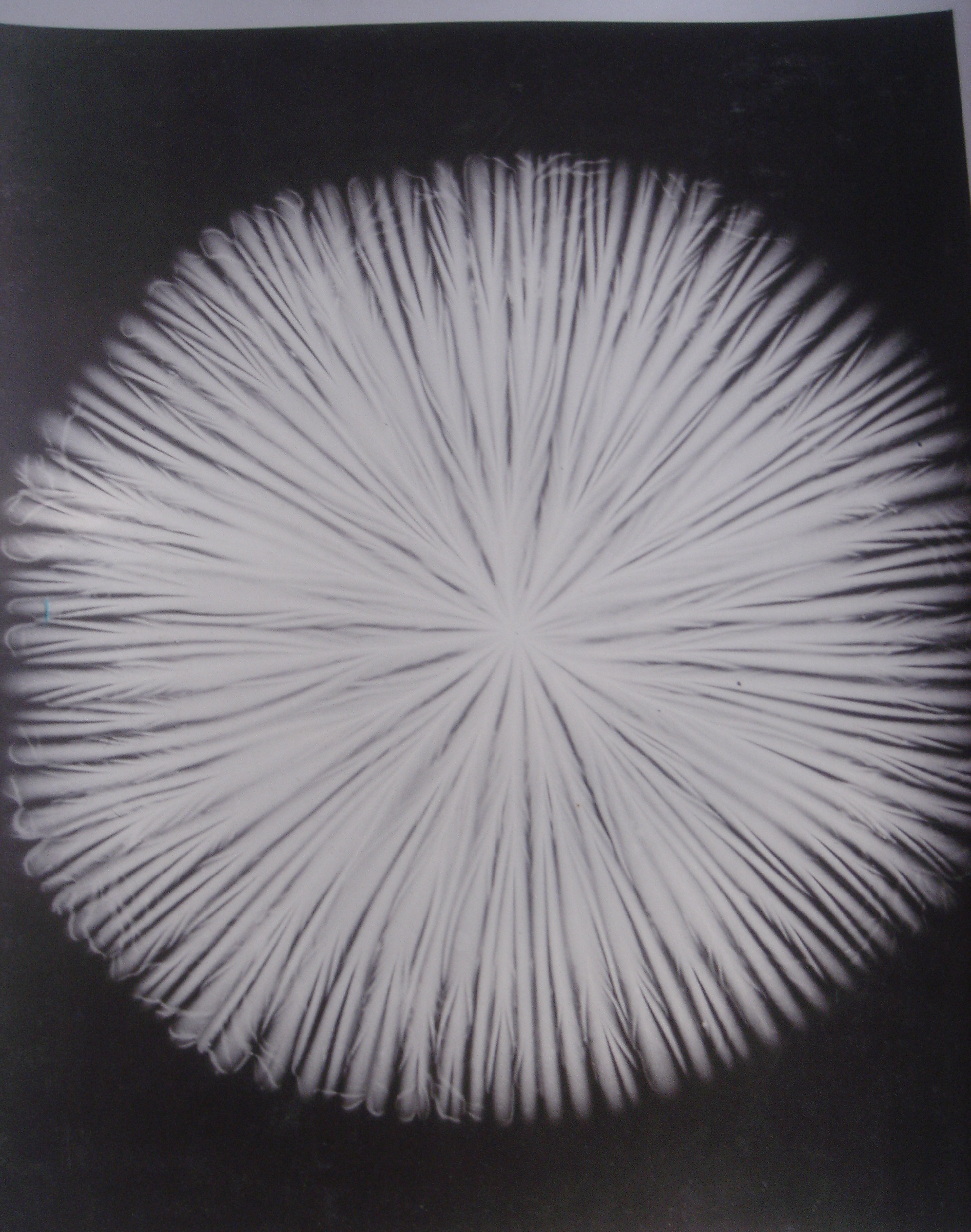
lectricity changes from a centr

e of Electricity over

Condenser Series.







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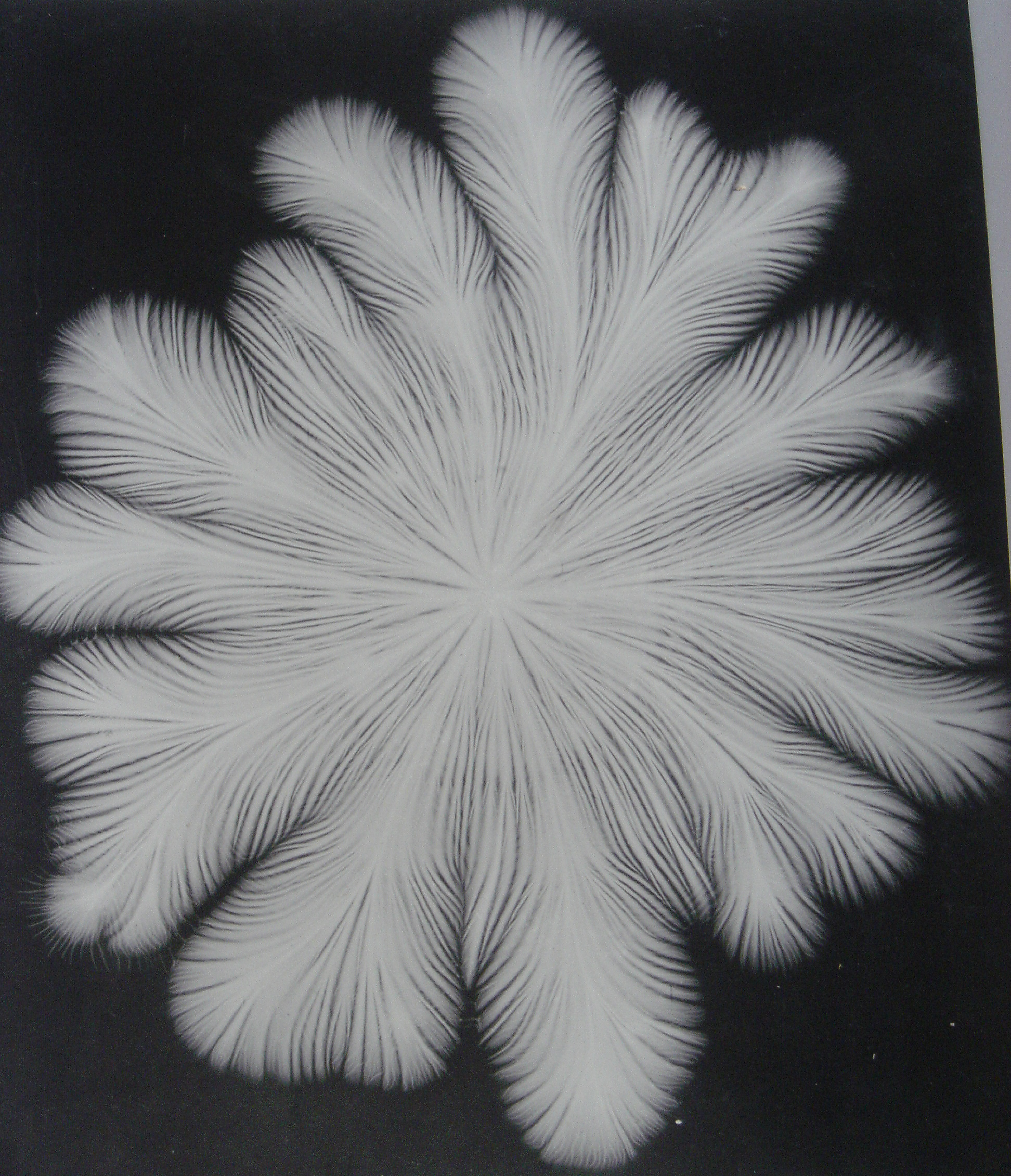

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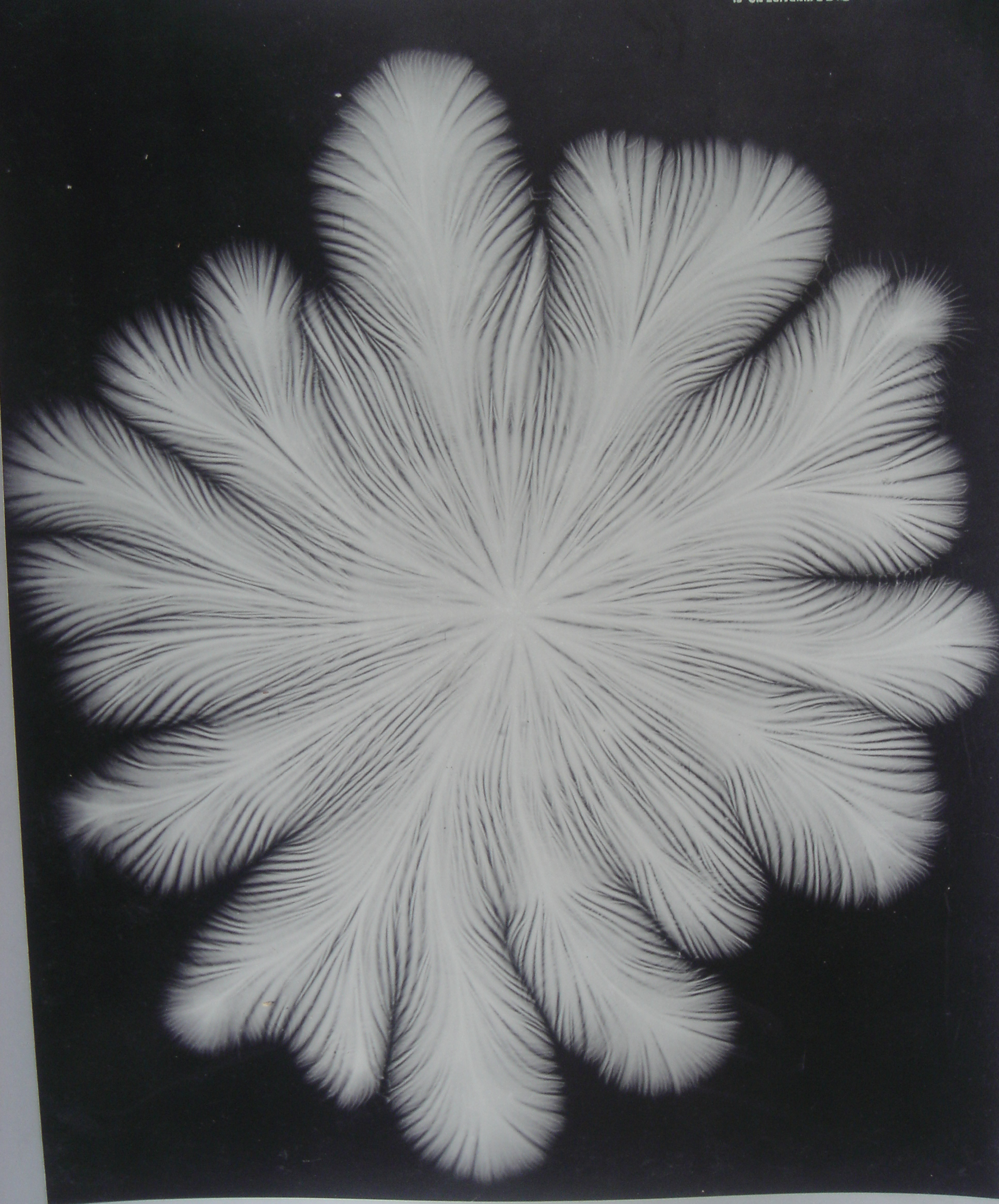
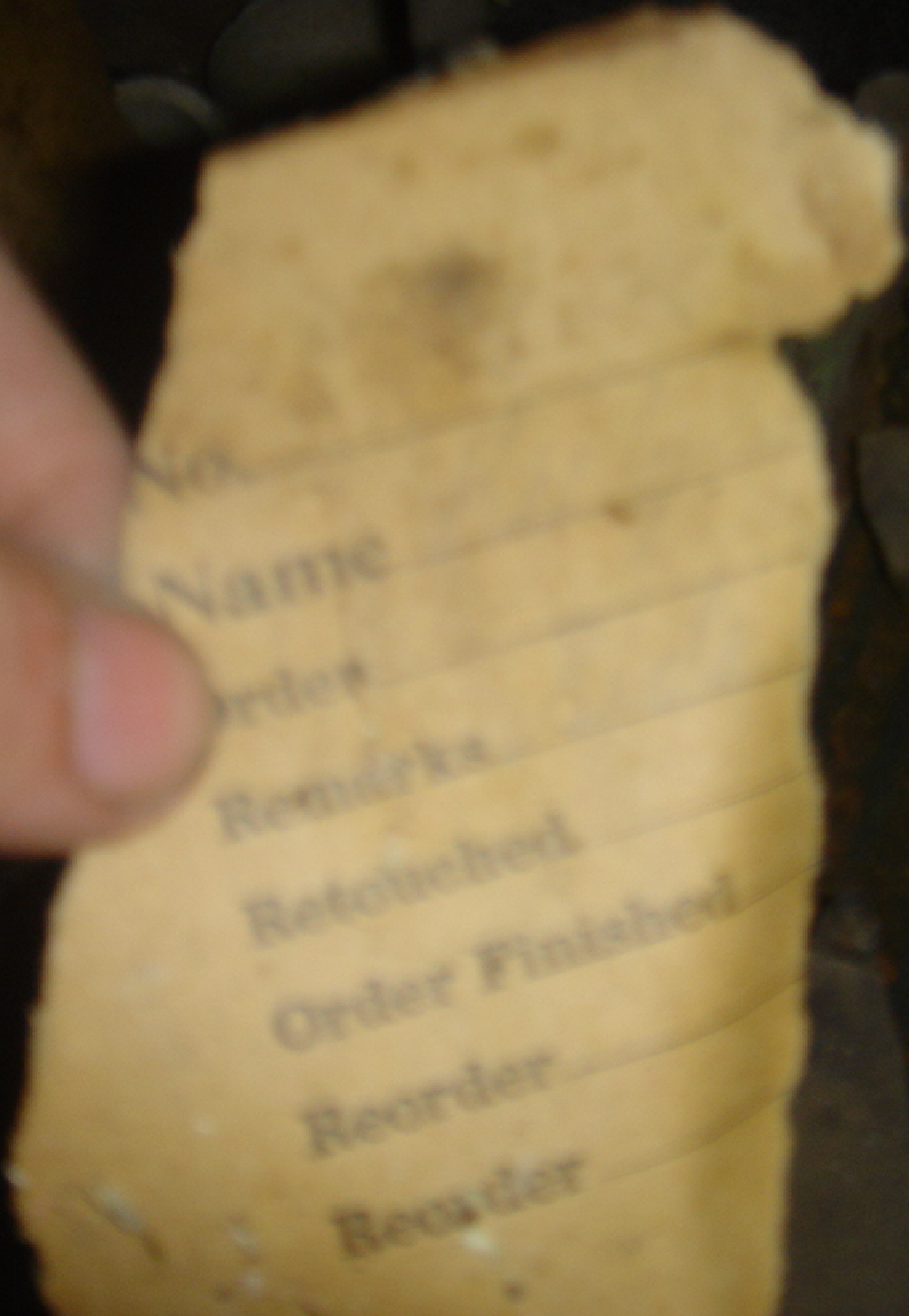


38



No.

Name

Order

Remarks

Retouched

Order Finished

Reorder

Reorder

No.

Name

rder

Remarks

Retouched

Order Finished

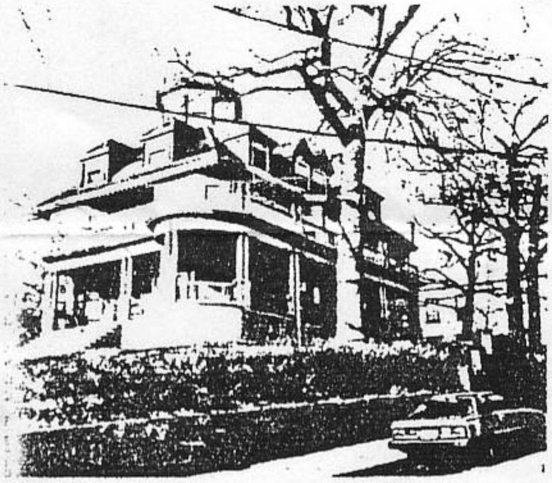
Reorder

Reorder

OSTON LANDMARKS COMMISSION Building Information Form Form No. 255 Area Jamaica Plain

ADDRESS 38 Spring Park Avenue COR. Adelaide Street

NAME
present original



MAP No. 18N/8E SUB AREA Hyde Square

DATE 1893-4 Building Permit
source

ARCHITECT James Murray Building Permit
source

BUILDER Winslow Chappell Building Permit
source

OWNER T. Burton Kinraid
original present

PHOTOGRAPHS JP 3.2/6-83; 3.3/1-83*; 3.3/4-83

PE (residential) [✓ single] double row [✓ 2-fam.] 3-deck ten apt. → IN 1929 CONVERSION); 1934 - CONVERSION TO 3 FAMILY
(non-residential)

. OF STORIES (1st to cornice) 2 plus Attic

OF Deck-on-hip; over-
anging and raftered. cupola octagonal with bracketed cornice dormers hipped on front; rear; hipped and gabled on sides.

TERIALS (Frame) [✓ clapboards] shingles stucco asphalt asbestos alum/vinyl
(Other) brick stone concrete iron/steel/alum.

EF DESCRIPTION Substantial rectangular plan Colonial Revival house with -story 3-sided bays flanking central entry and with impressive classically etailed porch that bows out at corner and wraps around most of Adelaide reet facade and displays paired columns supporting bracketed dentil corniced tablature and slender baluster rails at 1st and 2nd floors. Main entry on ring Park is reached by triple run of granite stairs. Steep single run of granite stairs leads to entry on Adelaide St.

ERIOR ALTERATION [✓ minor] moderate drastic

DITION [✓ good] fair poor LOT AREA 13,079 sq. feet

EWORTHY SITE CHARACTERISTICS On high double terraced spacious corner lot d deeply set back from Spring Park and Adelaide Streets. 2-7' granite ock retaining wall along street frontages.

(Map)

SIGNIFICANCE (cont'd on reverse)
Dramatically sited and architecturally distingusihed house,--the most extravagant and ambitious Colonial Revival residence in the Hyde Square area. #38 Spring Park Avenue is the dominant residential building on the street which is characterized by high quality development in mix of modestly

Moved; date if known ______________

Themes (check as many as applicable)

Aboriginal		Conservation		Recreation	
Agricultural		Education		Religion	
Architectural	x	Exploration/ settlement		Science/ invention	x
The Arts		Industry		Social/ humanitarian	
Commerce		Military		Transportation	
Communication		Political			
Community/ development					

Significance (include explanation of themes checked above)

scaled Italianate housing (see forms for #8, 16, 37R), --Queen Anne two-family, and triple decker dwellings (see forms for #32, 47).

#38 Spring Park was built for Thomas B. Kinraid who lived there from ca. 1895 through the early '20's, and who was the proprietor of the Spring Park Laboratory which was housed in the building. The May 31, 1893 building permit for #38 indicates that the use of the proposed single-family dwelling also included designs for an electrical workshop.

James Murray the architect of #38 Spring Park Avenue was a Roslindale resident who maintained a Boston office during the 1890's through the 1930's, and around 1893 also worked out of an office at 174 Lamartine Street in Jamaica Plain. Murray's work during the '90's and at the turn-of-the-century included single family, two-family, and triple decker housing in South Boston, Brighton, Roxbury, Jamaica Plain, and Roslindale. (also see form for 362 Arborway)

Preservation Consideration (accessibility, re-use possibilities, capacity for public use and enjoyment, protection, utilities, context)

Bibliography and/or references (such as local histories, deeds, assessor's records, early maps, etc.)

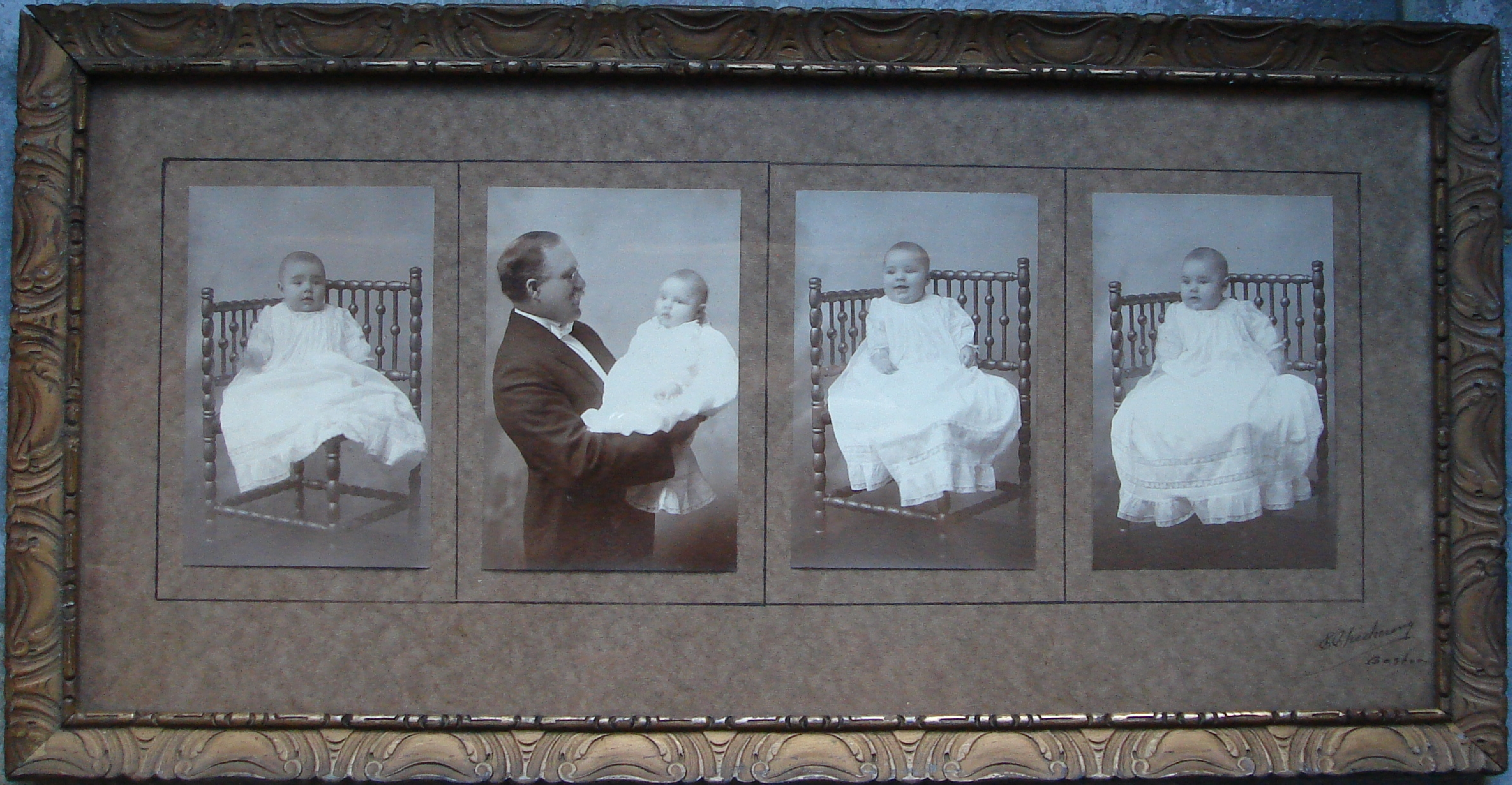
Building permit. May 31, 1893.
Bromley, Atlases 1890; 1896; 1914.
Architectural Archive. Art Department (BPL) James Murray.
Boston Directories: 1888-1935 (James Murray)
1888-1932 (Thomas B. Kinraid)

38

Charmglow

GRAEBEL VAN LINES
(713) 937-1115
Benjamin Moore Paints

EBEL


Boston

Wellesley House Appears In Model

Architectural Student Drawing And Activities Shown In Variety

Exhibition of work done by various classes on the Technology Laboratory House, a dwelling designed and to be constructed by Technology students on a lot in Wellesley already purchased is featured by the Department of Architecture, City Planning, and Architectural Engineering. This is located in Building 2, first floor.

The building of this house represents an attempt to coordinate actual construction work with the ordinary courses in drafting.

Drawings Shown

The first semester work demonstrating preparation for this project consists of a group of selected drawings dealing with the fundamentals of architectural drafting, dimensioning, construction and orientation. Second-year work demonstrates the progressive stages of the house plans, from the most elementary ones to the present virtually completed working drawings. A scale model of the house as it will appear is to be shown. This exhibit has been arranged by Edward M. Bridge and Robert C. Dean, instructors in the Department of Architecture. Courtland C. C. Hill, '40, and Andre F. Leman, '40, are in charge.

The committee in charge comprises: for Architectural Design: George N. Lykos, G; John A. Valtz, '36; Sydney B. Karofsky, '37; Benjamin W. Irwin, Jr., '38; John C. Heintzelman, '39; Courtland C. C. Hill, '40. Free Hand Drawing: John P. Allen, '36. Color: John T. Murphy, '36. Model: Conover Fitch, '38. European Civilization and Art: James J. Souder, '36. Extra-curricula activities: Arthur H. Alexander, '38.

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Engineers

BOSTON - NEW YORK

DIRECTORY of EXHIBITS

The following directory is intended to aid those visitors who desire to proceed through the buildings, or a part of them, in order. By means of this listing, one may learn exactly the nature of the display on the particular floor of the building in which he is located.

Some attempt has been made to emphasize those exhibits which should not be missed.

BUILDING 2, BASEMENT

Chemical Engineering; Colloidal chemistry, 2-007.

BUILDING 2, FIRST FLOOR

Architecture: Designs, drawings, modeling, full length portrait.

Chemical Engineering: Laboratory thesis and research demonstrations. Recent chemical developments, exhibits.

Mathematics: Exhibits of computing devices, popular lectures, 2-170.

BUILDING 2, THIRD FLOOR

Drawing Rooms: Samples of work in descriptive geometry and drawing.

Chemistry: Chemical Flower Garden; Quartz Apparatus Display. Outside 2-310.

BUILDING 2, SECOND FLOOR

Chemical Engineering: Quantitative Analysis Laboratories, Exhibit, "Children of the Depression"; recent chemical developments.

BUILDING 4, BASEMENT

X-Ray Examination of Metals, 4-041.

Department of Ceramics: Laboratories Open. Brick Making and Pottery, 4-034.

Applied Chemical Research, Room 4-047.

BUILDING 4, FIRST FLOOR

Room 4-138: Exhibition by The Tech; Control Room of radio, telephone and teletype network. Public Address system, news flashes, short wave reports of Crew Race, Track Meets, and Technique Rush.

Room 4-145: Heat Measurements Laboratory.

Freshman Chemistry Laboratories.

BUILDING 4, SECOND FLOOR

Room 4-270: Glass Blowing and Quartz Working Exhibit by Chemistry Department.

Freshman Chemistry Laboratories, Rooms 4-251 and 4-261.

BUILDING 4, THIRD FLOOR

Room 4-370: Demonstration of Chemiluminescence, "Cold Light" and Fluorescence Exhibit.

Geology Exhibit, Mineralogical Exhibit, Crystal Structure.

Room 4-310: Junior Optics Laboratory.

Note: All the Research Laboratories in Building 6 will be open.

BUILDING 6, BASEMENT

Entrance to Spectroscopy Laboratories in insulated building. Diffraction Gratings. Measurement of Spectra.

BUILDING 6, FIRST FLOOR

Demonstration of Glass Blowing by Physics Department, Room 6-120.

BUILDING 6, SECOND FLOOR

Rooms 6-215, and 6-217: Exhibit of Gaseous Discharge.

Room 6-205: "Seeing Sound" with Cathode Ray Tube; Electronics Laboratory.

BUILDING 6, FOURTH FLOOR

Room 6-414: X-Ray Laboratories. Research Laboratories.

BUILDING 8, BASEMENT

Room 8-010: Smelting Scrap Battery Plates, Blast Furnace.

BUILDING 8, FIRST FLOOR

Room 8-130: Ore Crushing and Concentration, Stamp Mills.

BUILDING 8, SECOND FLOOR

Room 8-210: Leaching and Electrolytic Refining; Oil Well Exhibit, Model Well in operation; Exhibit of Modern Ore-Dressing Methods.

Room 8-205: Movies of Oil Wells, Mining.

BUILDING 8, THIRD FLOOR

Room 8-330: Assaying of Gold and Silver Ores, Fire Assay Laboratory.

BUILDING 8, FOURTH FLOOR

Room 8-410: Heat Treatment of Metals and Alloys.

Room 8-434: Microscopic Examination of Metals.

Room 8-403 and Room 8-405:X-Ray Slides, X-Ray Examination of Metals.

BUILDING 10, BASEMENT AND FIRST FLOOR

Rooms 10-050 and 10-150: Dynamo Laboratory: Demonstrations; Behavior of an Alternator under Varying Conditions; Telephone Dial System; Power Angle Measuring Device Using Edgerton Stroboscope; Man Power Machine; Mercury Arc Rectifier; Reversing Motor; Exhibits: Power Taken by Home Appliances; Historical Development of Electrical Machinery.

Room 10-160: Measurements Laboratory: Demonstration of Edgerton Stroboscope; Reaction Timer.

BUILDING 10, SECOND FLOOR

Room 10-250: Edgerton High Speed Motion Pictures. Alternating hours with Chemistry and Physics Lectures by freshmen.

Room 10-267: Course VI-A Exhibit; Examples of Products of Cooperating Companies; Type of Work Undertaken by VI-A men; Publications of the Cooperative Course.

BUILDING 10, THIRD FLOOR

Communications Laboratory: Display of Miniature Broadcasting System; Ultra-Short Wave Transmitters; Transmission of Sound by Light Waves. Room 10-385.

BUILDING 10, FOURTH FLOOR

Department of Biology and Public Health; Laboratories and Exhibits; Model Modern Community; Apparatus Demonstrating Circulation of the Blood; Industrial Fermentations; Flood Movies; Bacteria Metabolism.

BUILDING 11, INFIRMARY

A doctor and nurse are in attendance to care for any illness.

BUILDING 3, BASEMENT

Room 3-050: Steam Laboratory; Apparatus in Operation.

Room 3-003: Electronics Laboratory; Construction of Vacuum Tubes; Automatic No-Drink Fountain; Beauty Parlor; Blow Tester; No-Show Peep Box.

BUILDING 3, FIRST FLOOR

Steam Laboratory: Display of Automobile and Airplane engine parts.

BUILDING 3, SECOND FLOOR

Steam Laboratory.

BUILDING 3, THIRD FLOOR

Machine Tool Laboratory: Lathes, Grinding Machines, Milling, Broaching, Profile Cutting and Automatic Gear Cutting Machines. Room 3-350.

Textile Laboratories: Rooms 3-311 and 3-315.

Room 3-305: Display of Signal Corps equipment.

Room 3-310-A: Display of Coast Artillery Instruments.

BUILDING 5, FIRST FLOOR

Nautical Museum: Display of Ship Models; pieces of Historical Significance. Model Construction.

BUILDING 5, SECOND FLOOR, AND BUILDING 1, SECOND FLOOR

Building Construction. Exhibit of Waterproof Wall Construction; Talking Movies.

BUILDING 1, BASEMENT

Sanitary Engineering Laboratory, Room 1-045: Complete Miniature Water Treatment Plant; Mixing and Sedimentation Basins, Sand Filter, Coagulation, sedimentation and Washing Processes, in actual operation.

Room 1-047: Earthquake Research. New M. I. T. Earthquake Machine; Demonstration of effect of Earthquakes; Models.

BUILDING 1, FIRST FLOOR

Room 1-110: Testing Materials Laboratory; Tensile Tests, Shear and Compression Tests.

BUILDING 1, SECOND FLOOR

Room 1-210: Testing Materials Laboratory.

Room 1-235: Building Construction Exhibit.

Room 1-290: Building Construction Exhibit.

BUILDING 1, THIRD FLOOR

Room 1-310: Testing Materials Laboratory.

Room 1-335: Soil Mechanics Laboratory; Demonstrations of Quicksand, Lateral Pressures; Display of Soil Testing Apparatus.

Room 1-345: Model of Summer Surveying Camp, Surveying Instruments, Airplane Mapping, Model of Hydro-electric Plant, Structural Models.

ENTRANCE 69 MASS. AVE.

Two Busses to be used on Thorne-Loomis Industrial Tour of Europe.

BUILDING 35

Foundry and Welding Laboratories: Demonstration of Welding, Forging, Metal Working, and Founding of Metals.

BUILDING 46

Refrigeration, Heating and Ventilating, and Air Conditioning Laboratories.

BUILDING 33

Aeronautical Engineering Department; Wind Tunnels and Airplane Design; Display of Automobile and Airplane Engine Parts.

BUILDING 31

Automotive Engineering Laboratories. Check Your Car's Speedometer; Performance Tests on Automobile Engines, Tests at 3, 4, 5, and 7 P. M.

BUILDINGS 20 AND 21

River Hydraulics Laboratories: Model of Cape Cod Canal in operation.

CHARLES RIVER

Crew Races for Compton Cup: Harvard, Princeton and M. I. T. competing, 3:00 P. M.

TECH FIELD

Track Meet, M. I. T. vs. University of Maine, 2:00 P. M.

Technique Rush, 4:00 P. M.

WALKER MEMORIAL

Center of Undergraduate Activities with offices of The Tech, The Technology Christian Association, The Tech Engineering News, Voo Doo, M. I. T. Athletic Association, Technique, Tech Show, Musical Clubs, and Institute Committee.

Dining Halls open all day.

Explanation of room numbering sytem: Room numbers are divided into two parts. The part before the hyphen refers to the building number, while the last three figures after the hyphen designate the number of the room in that building. The first of these three digits refers to the floor. Odd-numbered buildings are on the West side of the great court, while even-numbered buildings are on the East side. Building numbers higher than 11 are in the rear of the main group. When in doubt ask a uniformed guide.

Copper Smelted In Big Blast Furnace

Cottrell Mechanical Rectifier Also To Be In Mining Exhibition

Copper smelting with a blast furnace is being demonstrated in Room 8-010 as a part of the Mining and Metallurgy exhibition.

Copper ore and carbon is fed into the top of the twelve-foot furnace; air is blown into the molten mass through holes in the lower part of the furnace to facilitate combustion, and molten copper is tapped off at the bottom.

A Cottrell mechanical rectifier, working from 60 cycles A. C. furnishes the high potential of several hundred thousand volts needed for smelting. The low potential A. C. is first stepped up by a transformer and then is rectified by the rotary rectifier, which is turned by a synchronous motor operating from the power line.

Scrap storage battery plates are smelted in 8-010 by a process recently developed by Professor Carle R. Hayward. In the past it has been impossible to reclaim lead from old battery plates on a profitable basis because of the expense of eliminating sulphates. Professor Hayward has overcome this difficulty in his new process.

In charge of the Course III exhibitions is Thomas R. Kinraide, '37. Ceramics is being supervised by Norman A. Matthews, '37; electrochemistry, Harry Udin, '37; geology, Robert U. King, '36; metallurgy, Norman A. Birch, '37; physical metallurgy, Blake M. Loring, '37; and petroleum, Leo C. Avondoglio, '37.

High Speed Motion Pictures Exhibited

Drop Formation Photos Taken At 1200 Per Second

Motion pictures of drop formations taken at the rate of 1200 pictures per second under the direction of Prof. Ernst Hauser, of the Chemical Engineering Department are being shown in Room 4-370 at 3:00, 4:00, 5:00, 7:00, 8:00 and 9:00 P. M. They extend over a period of about fifteen minutes.

Through the aid of these pictures a curious phenomenon has been recently observed in connection with the surface tension of a newly-formed surface. Measurements of the tension of a surface one thousandth of a second after it has been formed has been made and it is definitely established that the tension increases according to the length of time the surface has been formed.

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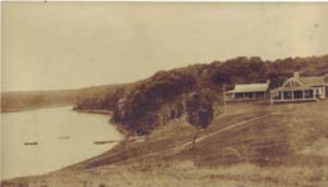
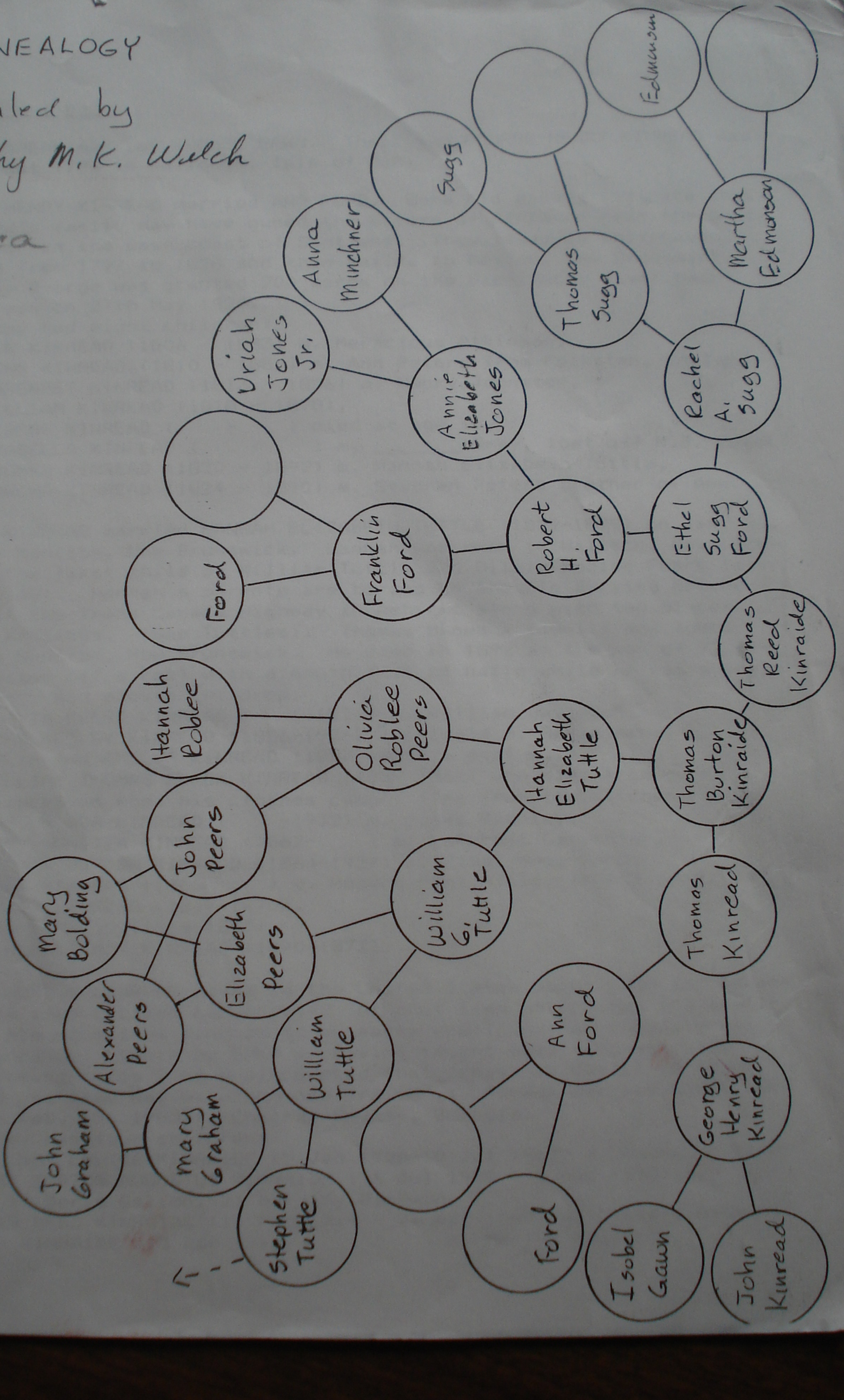


THE HERMITAGE. SPECTACLE POND. SANDWICH MASS. 466

GENEALOGY

Compiled by
Dorothy M.K. Welch

to Becca


Edmunson
Sugg
Martha Edmonson
Thomas Sugg
Anna Minchner
Uriah Jones Jr.
Annie Elizabeth Jones
Rachel A. Sugg
Ethel Sugg Ford
Robert H. Ford
Franklin Ford
Ford
Thomas Reed Kinraide
Hannah Roblee
Olivia Roblee Peers
Hannah Elizabeth Tuttle
Thomas Burton Kinraide
John Peers
Mary Bolding
Elizabeth Peers
William G. Tuttle
Thomas Kinread
Ann Ford
Alexander Peers
William Tuttle
Mary Graham
John Graham
Stephen Tuttle
Ford
George Henry Kinread
Isobel Gawn
John Kinread

KINRAIDE

JOHN KINREAD married ISOBEL GAWN. Their son GEORGE HENRY KINREAD was born about 1782 in Ballough, Isle of Man.

GEORGE HENRY KINREAD married ANN FORD. Some old papers indicate that Ann Ford's family may have owned the Estate of Finhaven near the South Esk River on the east coast of Scotland. They lived in Whitehaven, England from 1797 to 1820 and then sailed to Rexton, New Brunswick, Canada. George was granted 200 acres on the Richibucto River near Mill Creek on 27th May 1820.

They had eight children:
ANN KINREAD (1806 - 1883) m. Meracious Atkinson,
JOHN KINREAD (1810 - 1886) m. Ann Peters from Folksten, England,
MARGARET KINREAD (1813 - 1856) m. Henry Johnston,
WILLIAM KINREAD (1818 - 1898),
GEORGE KINREAD (-) died at age 16,
ISABELLA KINREAD (-) m. ________ Gray, lost off N.B. coast
THOMAS KINREAD (1820 - 1892) m. Hannah Elizabeth Tuttle,
and MARTHA KINREAD (1824 - 1890) m. Stephen Peters brother of Ann.

THOMAS KINREAD married HANNAH ELIZABETH TUTTLE (1829-1899) on Jan. 26, 1854 in Moncton, New Brunswick. Hannah was born in Wallace, Nova Scotia as the first child of William Tuttle and Olivia Roblee Peers (maybe Akerley). Hannah's parents are buried in the Old Burying Ground just off the Trans Canada Highway in Amherst along with two of her twelve siblings. (See Tuttles). Thomas owned a sawmill and lumberyard in Moncton, New Brunswick. He died in 1892 at the age of 72 after falling off a roof with a mouth full of nails while he was shingling. They had eleven children:

OLIVIA PEERS KINREAD (-1931) m. William Davidson,
JOHN WESLEY KINREAD (1856-1926) a cripple m. Sadie Amos,
JULIA ANN AMELIA KINREAD (1857-1889) a deaf mute,
WILLIAM THOMAS BLACK KINREAD (1859-1862) who died from burns received when his clothes caught fire from the kitchen range,
MARTHA ADA KINREAD (-1932) m. James Stanley,
MARY ANNETTA KINREAD (1862-) m. LaForest Carpenter,
THOMAS BURTON KINREAD (1864-1927) m. Ethel Sugg Ford,
RUBY KINREAD (1866-) m. Robert Peel Ripley from Nappan, N. S.
JAMES KINREAD (1867-1870),
IRA KINREAD (1868-1870),
VIOLETTA MAY KINREAD (1870-1872).

THOMAS BURTON KINREAD moved to the United States about 1888 and became a naturalized citizen about 1894. At that time he changed the spelling of his name from Kinread to an early spelling from the Isle of Man, Kinraide. (Note by DMKW -- having taught some students with Gaelic backgrounds I have discovered that "read" in Gaelic is pronounced the same way we pronounce "raide".) Thomas married ETHEL SUGG FORD on Feb. 15, 1905 in Chatham County, Georgia.

They had four children:
CECIL RAY LOUISE KINRAIDE (5 Jan 1906-10 Jul 1967) m. Robert Mockler
ROBERT BURTON AUGUSTUS KINRAIDE (26 Jul 1908 - 1 Aug 1995) m. 1) Doris Dalton, 2) Dorothy Dickson
THOMAS REED KINRAIDE (11 Feb 1914 - 21 Apr 1998) m. Claudia Bassett
LEONA KINRAIDE (15 Apr 1916 -) m. Merlyn Kugler

At Old Ballaugh Church are buried

Thomas Kinrade of Killabrega, Lezayre
died 1851 age 49

Jane Kinrade (his wife) 1878 age 74

Thomas (his son) 1872 age 37

Hugh Kinrade of Killabrigga 1877 age 60

Catherine Ann Kinrade widow of John
Killabrega, Lezayre 1825 age 77

Thomas Kinread of Killebricke 1763 age 75

There are other Kinrades buried at new Ballaugh church but they are too recent.

Also there are 2 Gawnes at Old Ballaugh
Phillip died 1898 age 86
and Ellen died 1870 age 66

FAMILY GROUP SHEET

RELATIONSHIP: DMKW's great, great grand parents

HUSBAND: GEORGE HENRY KINREAD
BORN: about 1782 in Ballough, Isle of Man
PARENTS: JOHN KINREAD
ISOBEL GAWN
MARRIED:
OCCUPATION:
DIED: about 1860
BURIED:

WIFE: ANN FORD
BORN:
PARENTS:

MARRIED:
OCCUPATION:
DIED:
BURIED:

Some old papers indicate that Ann Ford's family may have owned the Estate of Finhaven near the South Esk River on the east coast of Scotland.

CHILDREN:

1) NAME: ANN KINREAD
BORN: May 7, 1806 in Whitehaven, England
MARRIED: MERACIOUS ATKINSON on October 4, 1824
CHILDREN:
LIFE:
DIED: July 7, 1883 in Rexton, New Brunswick
BURIED:

2) NAME: JOHN KINREAD (1810 - 1886) m.
BORN: August 8, 1810 in Whitehaven, England
MARRIED: ANN PETERS from Folksten, England
born July 10, 1817, died November 18, 1895 in Moncton, N.B.
CHILDREN: JOHN R.
EDITH A.
LIFE:
DIED: December 20, 1886 in Moncton, N. B.
BURIED: both at Elmwood Cemetery, Moncton, N.B.

3) NAME: MARGARET KINREAD
BORN: 1813 in Whitehaven, England
MARRIED: HENRY JOHNSTON
CHILDREN:
LIFE:
DIED: August , 1856 at Methodist Point, Rexton, N.B.
BURIED:

Killebricke

~~Thomas~~

THOMAS KINREAD

buried April the

23. 1763 aged 75.

Rector Cyril Rogers

HUSBAND: GEORGE HENRY KINREAD
WIFE: ANN FORD

CHILDREN CONTINUED:

4) NAME: WILLIAM KINREAD (1818 - 1898),
BORN: 1818 in Whitehaven, England
MARRIED:
CHILDREN: WILLIAM RENFORD
LIFE:
DIED: January 5, 1898 in Rexton, New Brunswick
BURIED:

5) NAME: GEORGE KINREAD
BORN:
MARRIED:
CHILDREN:
LIFE:
DIED: at age 16
BURIED:

6) NAME: ISABELLA KINREAD
BORN:
MARRIED: ________ GRAY
CHILDREN:
LIFE:
DIED: lost at sea between Amherst and Rexton off N.B. coast
BURIED:

7) NAME: THOMAS KINREAD (see fgs)
BORN: December 22, 1820 in Rexton, New Brunswick
MARRIED: HANNAH ELIZABETH TUTTLE
CHILDREN: OLIVIA PEERS, JOHN WESLEY, JULIA ANN AMELIA,
WILLIAM THOMAS BLACK, MARTHA ADA, MARY ANNETTA,
THOMAS BURTON, RUBY, JAMES, IRA, VIOLETTA MAY
LIFE: Owned a sawmill and lumberyard in Moncton, New Brunswick
DIED: October 5, 1892 in Moncton, New Brunswick
BURIED:

8) NAME: MARTHA KINREAD
BORN: 1824 in Rexton, New Brunswick
MARRIED: STEPHEN PETERS (brother of Ann) from Folkston, England
CHILDREN: EDITH
ELLA
LIFE:
DIED:Jan 30, 1890 in Moncton, New Brunswick
BURIED: both buried at Elmwood Cemetery

FAMILY STORY:

George and Ann Kinread lived in Whitehaven, England from 1797 to 1820 and then sailed to Rexton, New Brunswick, Canada. George was granted 200 acres on the Richibucto River near Mill Creek on 27th May 1820.

John Kinread m in 1781

his parents could be:

Ewan Kinread / Alice Cowley c. Aug. 29 1739 — Douglas

Philip Kinread c. Sep. 9 1739 – Lezayre

Ewan Kinread / Elizabeth Cottier c. Nov. 24 1756 – Lezayre

John Kinread / Anne Cowin c. Nov. 30 1760 – Braddan

John Kinread / Catherine Stole c. Mar. 21, 1762 – Maughold

John Kinread / Joana Neal c. Dec. 5 1762 – Douglas

Isabel Gawn m. in 1781

her parents could be:

William Gawn / Mary Quiggin c. 27 Sept. 1747 – Malew

John Gawn / c. 6 Oct 1751 – Andreas

Henry Gawn / Isabel Taylor c. 9. April 1758 · Kirk Rushen

FAMILY GROUP SHEET

RELATIONSHIP: DMKW's great grand parents

HUSBAND: THOMAS KINREAD
BORN: December 22, 1820 either in Rexton, New Brunswick or at sea on his father's fishing boat headed for Canada
PARENTS: GEORGE HENRY KINREAD
ANN FORD
MARRIED: Jan 26, 1854 by Rev. J. R. Allen in Moncton, N.B.
OCCUPATION: Owned a sawmill and lumber yard on Wesley Street in Moncton, New Brunswick
DIED: October 5, 1892 in Moncton, New Brunswick due to a fall from the roof while shingling with a mouth full of nails. He had all his own teeth at the age of 72.
BURIED:

WIFE: HANNAH ELIZABETH TUTTLE
BORN: September 15, 1829 in Wallace, Nova Scotia
PARENTS: WILLIAM G. TUTTLE
OLIVIA ROBLEE PEERS
MARRIED:
OCCUPATION:
DIED: March 19, 1899
BURIED: Forest Hills Cemetery, Jamaica Plain, Massachusetts
The lot is #4868 between the Oxalis Path and Arabis Path.

CHILDREN:

1) NAME: OLIVIA PEERS KINREAD
BORN:
MARRIED: WILLIAM DAVIDSON
CHILDREN: WILLIAM m. BERYL DeVER
LIFE:
DIED: 1931
BURIED: Wyoming Cemetery in Melrose, Massachusetts

2) NAME: JOHN WESLEY KINREAD
BORN: 1856 in Rexton, New Brunswick
MARRIED: SADIE AMOS
CHILDREN: (none)
LIFE: a cripple
DIED: October 1926
BURIED: Elmwood Cemetery in Moncton, New Brunswick

3) NAME: JULIA ANN AMELIA KINREAD
BORN: November 4, 1857 in Moncton, New Brunswick
MARRIED:
CHILDREN:
LIFE: a deaf mute
DIED: October 19, 1889 in Moncton, New Brunswick
BURIED:

FAMILY GROUP SHEET PAGE 2

HUSBAND: THOMAS KINREAD
WIFE: HANNAH ELIZABETH TUTTLE

CHILDREN CONTINUED:

4) NAME: WILLIAM THOMAS BLACK KINREAD
BORN: January 11, 1859 in Moncton, New Brunswick
MARRIED:
CHILDREN:
LIFE:
DIED: August 29, 1862 in Moncton, New Brunswick from burns received when his clothes caught fire from the kitchen range.
BURIED:

5) NAME: MARTHA ADA KINREAD
BORN:
MARRIED: JAMES STANLEY
CHILDREN: NETTIE
WESLEY m. JULIA LYAN
GARNET (- 1935)
DORSEY (- 1918)
ROY
+ 2 boys and 1 girl who died from Diptheria
LIFE: Lived in Boylston, Massachusetts
DIED: March 8, 1932
BURIED: Mt. Hope Cemetery in New York City, New York

6) NAME: MARY ANNETTA KINREAD (Aunt Nettie)
BORN: October 1862
MARRIED: LaFOREST CARPENTER born July 1859 in New Hampshire
CHILDREN: ETHEL (changed to SHIRLEY)
RACHEL (known as RAY)
LIFE: Uncle LaForest and Aunt Nettie lived for several years at the Hermitage in Sandwich, Mass. taking care of the farm year round.

LaForest is listed in the 1900 census as being a day laborer boarding at 550 Columbus Avenue, Ward 12, Boston, Massachusetts with Mary A. Ford.

Annetta is listed as having immigrated from Canada in 1887.
DIED:
BURIED:

7) NAME: THOMAS BURTON KINREAD (known as "Burt") (see fgs)
(named after their minister Thomas Burton Smith)
BORN: July 1, 1864 in Moncton, New Brunswick
MARRIED: ETHEL SUGG FORD on February 15, 1905
CHILDREN: CECIL LOUISE, ROBERT BURTON, THOMAS REED, LEONA
LIFE: Immigrated from Moncton to Boston between 1884 and 1888. Worked at Waltham Watch Factory and later as an inventor. (See family story under his family group sheet)
DIED: June 29, 1927 in San Jose, California
BURIED: Forest Hills Cemetery, Jamaica Plain, Massachusetts

FAMILY GROUP SHEET PAGE 3

HUSBAND: THOMAS KINREAD
WIFE: HANNAH ELIZABETH TUTTLE

CHILDREN CONTINUED:

8) NAME: RUBY KINREAD
BORN: June 28, 1866 in Moncton, New Brunswick
MARRIED: ROBERT PEEL RIPLEY from Nappan, N. S. on July 11, 1888
CHILDREN: ALBERTA MARIA (Bertha) (1890 -)
ARTHUR ROBERT (1891 - 1917 at Vimy Ridge)
PERCY WILLIAM (1893 -)
LLOYD KINREAD FORD (1900 -) m. LOUISE GIFFORD
LIFE: Lived in Moncton, New Brunswick. In later years Mrs. Ripley lived with her son on Weldon St. in Moncton. Their son Arthur was killed in action at Vimy Ridge, France on April 6, 1917 and is buried in Rocklincourt H'l'ds Cemetery 2 3/4 miles north of Arras, France.
DIED:
BURIED:

9) NAME: JAMES KINREAD
BORN: September 11, 1867 in Moncton, New Brunswick
MARRIED:
CHILDREN:
LIFE:
DIED: November 7, 1870
BURIED:

10) NAME: IRA KINREAD
BORN: October 27, 1868 in Moncton, New Brunswick
MARRIED:
CHILDREN:
LIFE:
DIED: May 18, 1870
BURIED:

11) NAME: VIOLETTA MAY KINREAD
BORN: December 22, 1870 in Moncton, New Brunswick
MARRIED:
CHILDREN:
LIFE:
DIED: April 5, 1872
BURIED:

FAMILY STORY:

Thomas and Hannah Elizabeth Kinread apparently lived all of their married life in Moncton, New Brunswick where Thomas owned a sawmill and lumber yard. Of their children Olivia, Ada, Nettie and Burt immigrated to the Boston area. Since Hannah is also buried near Boston, she must have moved to join her children after her husband's death.

FAMILY GROUP SHEET

RELATIONSHIP: DMKW's grand parents

HUSBAND: THOMAS BURTON KINRAIDE (known as "Burt")
(named after their minister Thomas Burton Smith)
BORN: July 1, 1864 in Moncton, New Brunswick
PARENTS: THOMAS KINREAD (see fgs)
HANNAH ELIZABETH TUTTLE
IMMIGRATED: From Moncton to Boston between 1884 and 1888.
MARRIED: February 15, 1905 in Chatham County, Georgia
OCCUPATION: Worked at Waltham Watch Factory and as an inventor.
DIED: June 29, 1927 in San Jose, California
BURIED: Forest Hills Cemetery, Jamaica Plain, Massachusetts

WIFE: ETHEL SUGG FORD
BORN: April 13, 1888 in Philadelphia, Pennsylvania
PARENTS: ROBERT FORD (see fgs)
RACHEL SUGG
MARRIED: 1) THOMAS BURTON KINREAD
2) WILLIAM CASPERSON
OCCUPATION:
DIED: May 14, 1933 at Parker Hill Hospital, Brookline or Boston, Massachusetts
BURIED: West Laurel Hill Cemetery, Philadelphia, Pennsylvania

CHILDREN:

1) NAME: CECIL RAY LOUISE KINRAIDE
BORN: January 5, 1906 in Jamaica Plain, Massachusetts
MARRIED: ROBERT DOUGLAS MOCKLER from Lisbon Falls, Maine on June 16, 1928 at 363 Walnut Street, Newtonville, Mass.
CHILDREN: NEDD DEAN (1934 -   ) m. BARBARA CAROL THOMPSON
(Nedd was an illigitimate child of Leona's adopted by Cecil)
LIFE: Cecil was named after Cecil Tilton, a famous woman doctor and a close friend of T. B. Kinraide. Cecil and Bob lived in Essex, Connecticut. I (DMKW) remember her as a very large woman when she came to visit us in Sandwich about 1960. After her death Bob remarried (Jerrie?) and lived in California from March 17, 1968 to his death on March 21, 1982. During the last months his heart trouble and emphysema necessitated oxygen. His body was flown to Maine to be buried near Cecil and his family.
DIED: July 8, 1967 in Leevis, Quebec, Canada while camping by trailer.
BURIED: Lisbon Falls, Maine after Bob drove her body there from Quebec. There was a memorial service in Essex, Connecticut

FAMILY GROUP SHEET PAGE 2

HUSBAND: THOMAS BURTON KINRAIDE
WIFE: ETHEL SUGG FORD

CHILDREN CONTINUED:

2) NAME: ROBERT BURTON CHARLES AUGUSTUS KINRAIDE (see fgs)
BORN: July 26, 1908 in Sandwich, Massachusetts
EDUCATION: graduated with B.Sc. in Mechanical Engineering from Massachusetts Institute of Technology in 1933
MARRIED: 1) DORIS DALTON (no children)
2) DOROTHY DICKSON
CHILDREN: DOROTHY MAY (1948 -) m. GARY ALAN WELCH
LIFE: Lived 60 years at 85 Bayley Street, Westwood, Mass Worked for 35 years for Clifford Manufacturing which became Standard Thompson Corporation. Fisherman, Fly Tyer, Mountain Climber, National Ski Patrolman, and Hunter (see family story)
DIED: August 31, 1995 at Charlwell House in Norwood, Massachusetts from Alzheimer's Disease and Pneumonia
BURIED: Westwood Cemetery, Westwood, Massachusetts

3) NAME: THOMAS REED KINRAIDE
BORN: February 11, 1914
MARRIED: CLAUDIA SEVERANCE BASSETT on October 23, 1937 at Episcopal Church on Centre Street in Newton Centre, Mass. Claudia was born in 1917 in Spokane, Washington
CHILDREN:
WILLIAM THOMAS BASSETT (1942 -) m BEVERLY BROOKFIELD
CLAUDIA SEVERANCE changed to PAMELA SAGE (1944 -)
m. 1) WALLACE PERRY DUNLAP III in 1972
2) STEPHEN DAHL HADLEY about 1985
LIFE: Tom worked as a Mechanical Engineer. Children were born while living in Connecticut and New York. Later they lived in Boylston, Waltham, Wayland and Shrewsbury Massachusetts.

Tom had heart bypass surgery in 1969 and was given 5 years to live; however, previous years of vigorous exercise as a National Ski Patrolman and sailor helped him prove the doctors wrong. He continued to Square Dance at the C-1 level beyond his 81st birthday.

DIED: April 21, 1998 in Shrewsbury, Massachusetts
BURIED:

4) NAME: ETHEL LEONA KINRAIDE
BORN: April 15, 1916 in Jamaica Plain, Massachusetts
MARRIED: MERLYN DEAN KUGLER from Nebraska on June 4, 1943 (D-Day) in Stamford, Connecticut (divorced)
CHILDREN: SUSAN (1945 -) m. DOMINIC INCERTO (divorced)
PETER (1947 -) m. KAREN
PAUL (1947 -) m. LOIS MAE ROSENBERG
NANCY (1951 -) m. THOMAS DYER
LIFE: Leona was trained as a nurse. She had problems with epilepsy.
DIED:
BURIED:

SOME MEMORIES RECOUNTED BY ROBERT KINRAIDE about 1985 to D. M. K. Welch

After Thomas Burton Kinraide came to the United States he settled in Waltham working in the Waltham Watch Factory. His boss was Mr. Bruce, a friend of Jenny Kingsbury. Mr. Bruce had lost a bone in his left hand in the Charge of the Light Brigade during the Crimean War.

One hot night T. B. went for a long ride on the street cars. In Jamaica Plain he could smell water, got off and walked towards it. Stopping at a house with people outside, he asked for a glass of water and so met Mrs. Reed. She later treated him as a foster son, supported his attempts at inventions and helped him build a 25 room house in Jamaica Plain at 38 Spring Park Avenue on the corner with Adelaide Street. At that time she lived on Boylston Street across the block.

The basement of the house was blasted out of solid rock breaking many neighbor's windows. In the basement there was a hidden, mahogany-walled ballroom entered through a secret door in a wall of the front entry. When tripped, the door swung up to reveal a carpeted curving stairway down to the ballroom. The first floor also had two offices, a dining room panelled in oak with a stuffed moose head on one side and a caribou on the other, a large hall with a 20 foot long floor to ceiling mirror, a well-stocked machine shop across one side and a kitchen-pantry.

Up the stairs past double stained glass windows and a stuffed raven (T. B. called the house Ravenscroft), the second floor had a large hall containing a grandfather clock, a triple parlor divided by two archways with huge oil paintings and a stained glass window over the front door, a laboratory for chemistry, 3 bedrooms, a library, a den and a bathroom. The hall on the second floor was large enough for Robert to ride his tricycle there. The third floor had 4 guest rooms later bedrooms for children, a maid's room, a dark room and a bath.

For a few years before 1915, a woman known to Robert as Grandma Tilton lived on the third floor. She was a doctor and had her own cancerous breast removed to live into her 80's dying about 1915. Her full name was Cecil Tilton and Cecil Kinraide was named after her.

The roof was sheathed in copper in Mansard style. There was an octagonal cupola with an interior room and a stair to its roof for a spectacular view over Boston. There was also a 14 foot by 14 foot summer house or widow's walk which was later dismantled and taken to Sandwich for a beach cottage. Most of the house had electric lights but it also had gas lights in case the newfangled electricity failed.

In 1891 Robert Ford, a newspaper man, committed suicide because of financial difficulties. His wife, Rachel Sugg Ford brought her daughter Ethel to Boston from Philadelphia sometime after 1892. Ethel went to grammar school on Columbus Avenue while Rachel ran a boarding house at 550 Columbus. There is a picture of Rachel and Ethel Ford on the lawn of 38 Spring Park Avenue in 1902. Thomas married Ethel on February 15, 1905 in Chatham County, Georgia.

Cecil, Tom and Leona were born in the Jamaica Plain House. Robert remembers hearing Tom and Leona's first cry. Ethel and two maids were ill with Typhoid fever during the spring of 1908. The carrier was testing milk for freshness in Boston. Both maids died but Ethel lived to bear Robert prematurely. Robert was born in Sandwich requiring Dr. Proctor to come across Spectacle Pond in a rainstorm. The winter of 1914 (when Tom was born) a big snow storm closed all roads in Jamaica Plain to motor vehicle traffic for the rest of the winter.

T. B. was a avid fisherman. He fished around Jamaica Plain and bribed the policeman to allow him to fish for bass in Chestnut Hill reservoir. He also went on the train to the Cape to John Perceval's camp on Wakeby Lake in Sandwich. One morning early he walked through the woods to Spectacle Pond and found the place for sale and decided to buy it. His original purchase was the Gray lot including a Quaker building and a Quaker barn. The building was the original house Hezikiah Hoxie built and older than the restored Hoxie house in Sandwich.

The original house had a stone foundation and a large stone fireplace made with clam shells for lime in the cement. Over the years the house was added onto until it had 12 rooms and a screened porch around three sides. Separate from the house was an ice house, a woodshed, a shop and a log cabin. The 20 by 30 foot log cabin came from New Brunswick for a 1910 sportsman's show.

After T. B. met Mrs. Reed he gradually shifted his work to spending all his time on research supported by her. Her husband was the partner of Tiffany in Paris when it was called Tiffany and Reed. His research produced the most modern X-ray machine in existence in 1905. These he manufactured and sold. He also manufactured fluoroscope screens. All of his life he worked on a project regarding the fourth dimension trying to prove its existence using solid geometry. Stockholders supporting Keeley who claimed to have invented a perpetual motion machine hired T. B. to find out if it worked. Actually the machine was run by a monster clock spring in the wall. Furthermore, he spent quite a few years trying to learn to make perfume by pressing flowers between wax.

The people who spent the summer in Sandwich and the winter in Jamaica Plain belonged to the Sandwich Winter Club. One of the older women had been married in Sandwich. The wedding party missed the stagecoach so they all mounted on horseback and caught the stage before it arrived in Plymouth and thus she set out on her honeymoon.

The Cape Cod canal was built by a private millionaire named August Belmont. The day the canal was opened about 1914, they had dug from both ends leaving a small un-dug dam. Belmont's yacht was anchored on one side. When the tide was about equal, the last part was opened allowing Belmont to row through in a mahogany rowboat. T. B. was asked to ride in the rowboat but Ethel wouldn't let him.

In the summer of 1920, Ethel left Thomas. She and Rachel packed their bags at the Hermitage and walked out to East Sandwich to the Edgar's home. The children stayed with their father for a year. Robert was sent to Mitchell Military Academy in Billerica. After the legal separation, they went to live with their mother in Newton Center at 95 Prospect Street in an upstairs apartment. They spent the summer of 1921 in the Canal House in Sandwich where the engineers lived while the canal was being built. During the winter of 1920-1921 they lived at 363 Walnut Street in Newtonville. Will Casperson came to live there too after his mother-in-law Sally Sugg Gaines died. (Sally was Rachel Sugg's sister and Will was separated from her daughter Mammie Gaines and later divorced her). Rachel died on February 20, 1922 from a Coronary while Robert was ill in the next room with influenza. The family spent the summer of 1922 in Ocean City, New Jersey. During the winter of 1922-1923 they were back in Newtonville where Robert was repeating the 7th grade for the third time after the emotional upset and illness. The summers of 1923 through 1926 they spent at two cottages on Sunapee Lake. The first year Will rented the Dean Cottage after traveling by train and stage coach with Mr. Fancy to the area. The other summers they rented the Thomas Cottage. Thomas Burton Kinraide died on June 29, 1927 in San Jose, California. He is buried in Forest Hills Cemetery, Jamaica Plain, Massachusetts. Will Casperson married Ethel Sugg Ford Kinraide on October 10, 1927 in Newtonville, Massachusetts.

TUTTLE

According to Prof. Alva M. Tuttle genealogical research as compiled in "Tuttle Lines in America" we have the following information:

The "Tuttle" name seems to have been derived from a place name such as Tot-hill or Tuet-hill when means "a place to watch from" or "a sentry post". There were probably several such hills in various parts of England and therefore it is unlikely that all Tuttles have a common ancestor.

THOMAS TOLEYLL (1506 -) of Woodford, County Northampton, England, had a son Richard. (note, some uncertainty that this is the father's name.)

RICHARD (1530 - 1589) and ELIZABETH TOOTILL of Woodford, County Northampton, England had a son Symon.

SYMON TOOTILL (1560 -) and Isabel Wells of Ringstead, County Northampton, England had a son William.

WILLIAM (1607-1673) and ELIZABETH TUTTLE of Ringstead, England and New Haven, New Jersey had a son Joseph. William and Elizabeth came to America on the ship "Planter" in 1635. The ship landed in Charlestown, Massachusetts. William was 26 and Elizabeth 23. They had three children with them, ranging in age from 3 1/2 years to 3 months and nine more were born in America. One daughter, Elizabeth, married Richard Edwards and became the ancestress of many distinguished Americans including Jonathan Edwards, Arron Burr, Winston Churchill, Mrs. Theo. Rosevelt, Grover Cleveland and Gen. U. S. Grant. Another son was Joseph Tuttle from whom our line descends.

JOSEPH (1640-1690) and HANNAH MUNSON TUTTLE of New Haven, New Jersey had a son Stephen.

STEPHEN (1673-1709) and RUTH HIGGINS TUTTLE of New Haven, New Jersey had a son Timothy.

TIMOTHY (1696-1754) and CECELIA MOORE TUTTLE of Woodbridge, New Jersey had a son Stephen.

The following information comes from "The Valley of the Remsheg or History of Wallace Bay, Nova Scotia" by H. R. Brown published by the North Cumberland Historical Society

STEPHEN TUTTLE

Stephen was born in New Jersey about 1733 and lived there until some time around 1770 when he moved to the Province of New York where he acquired an estate of 1800 acres, more or less, near Fort Edward on the Hudson. He was a land Surveyor by profession and became Deputy Suveyor General for the Province. He was also a Justice of the Peace and a leading citizen generally.

He was married twice but the name of his first wife is not known and her children are rather a mystery. Stephen was married the second time around in 1765, several years before his removal from New Jersey to Fort Edward. His wife was MARY GRAHAM. It is believed that she was a daughter of JOHN GRAHAM of Bedminister, Somerset County, New Jersey. John Graham was a son of JAMES who was born in Scotland and settled in Monmouth County, New Jersey. John's sister Mary had a daughter Jane (cousin to Mrs.

Tuttle) who, on her way to be married, was attacked by a band of Indians and with her excort killed and scalped in August 1777. This event caused a great deal of mental distress to Mrs. Tuttle.

From the first, Stephen was consistently opposed to the Revolution. A part of his submission to the Royal Commission on Loyalists Claims, states, "At the breaking out of the troubles in 1774 he was offered a Company in the Rebel Service which he refused. He steadily and uniformly acted a Loyal part, he never took any Oath to the Americans, although it was tendered to him many times and he was threatened for his refusal. General Benedict Arnold threatened to hang him."

History books tell us that the location of their home near Fort Edwards placed them in the path of General Burgoyne's army. In 1777 Gen. Burgoyne led a British Army from Montreal to Lake Champlain, captured Fort Ticonderoga and slowly made his way across country to the Hudson River. Part of his expedition was sent into Vermont and almost destroyed at Bennington while the remainder of his army was stopped and turned back by two battles fought near Saratoga. His retreat to Canada was cut off by the militia, which swarmed in from New England, so Gen. Burgoyne was forced to surrender his army to the American, General Gates, at Saratoga on October 17, 1777. It was this important victory that caused the French to recognize American independence and ally themselves with the Rebels. Fort Edward lies about 20 miles north of the location of the Battle of Saratoga on a bend of the Hudson River as it curves west away from the direct route to Lake Champlain.

The anti-loyalist pressure became so great that in May 1779, he fled to Canada leaving his wife and family to follow, if and, when they could. In September 1779, Col. Goose Van Schaick wrote Governor Clinton "Major John Graham of my regiment is desireous of obtaining a Flag to get his sister with a large family of small children, conveyed to Canada to join her husband, who left her in the month of May with very little to support them". Gov. Clinton consented to the removal of Mrs. Tuttle and family and suggested that they be exchanged for the wife and family of Col. Campbell, captured by the British, at Cherry Valley, a year previously, and held prisoner in Canada. (The most direct route would have been north up Lake Champlain and over the divide to the St. Lawrence River.)

We next hear of him in a roster of Loyalists quartered at St. John's, Quebec, in March 1781 which shows Stephen Tuttle, aged 50, of the County of Albany with wife and five children, drawing a pension of 14 pounds. In the removal from New York, Mary Graham Tuttle was forced to leave behind her youngest daughter, Sarah who was reared by the Graham family. By 1783 Stephen was living 120 miles above Quebec. In this period he was employed by the British Authorities in surveying land grants around Carlisle in the Gaspe Peninsula.

Stephen and his three oldest sons eventually joined other loyalists from New Jersey and New York who were settling in the Remsheg area. After becoming established, he began the trip back to Quebec to bring his wife and youngest son to Nova Scotia. In what is now New Brunswick he met a band of Indians who asked him to go with them to their camp where they had a white woman. There he found his wife and son who had become weary with waiting and walked alone through the woods along the French troop trails between Quebec and Fort Beausejour in south eastern New Brunswick.

STEPHEN TUTTLE and MARY GRAHAM had six children:
WILLIAM TUTTLE (1766-1852) m. ELIZABETH PEERS
JOHN TUTTLE (1767-1835) m. Helener Horten (1770-1818)
and m. Katherine Thompson
STEPHEN TUTTLE (1770-1837) m. Sarah Dotten (1780-1842)
PETER TUTTLE (1776-1850) m. Hunter
GUY TUTTLE (1777-)
SARAH TUTTLE (1779-)

Stephen and Mary are buried at the old Pioneer Cemetery in Wallace Bay, A. M. Peers burying Ground.

WILLIAM TUTTLE married ELIZABETH PEERS (1777 - 1868)

Elizabeth was the daughter of Alexander Peers (1745-1816) and Mary Bolding (1745-1808). William and Elizabeth are buried in the Wallace Bay Cemetery. They had ten children:
MARY TUTTLE (1796-1829) m. John Ralston
(a Scotsman who always wore his plaid and carried knitting)
STEPHEN TUTTLE (1798-1856) m. Mary Anne Myers
WILLIAM TUTTLE (1803-1865) m. OLIVIA ROBLEE PEERS
DIANA TUTTLE (1807-1897) m. James B. Peers
BALDWIN TUTTLE (1810-1890) m. Margaret Scott
JAMES TUTTLE (1812-1890) m. Zilla Fisher and Ellen Cox
HELENER TUTTLE ( ) m. Samuel Phales
MARTHA TUTTLE (1814-1853) (did not marry)
ELIZABETH PEERS TUTTLE (1816-1894) m. John Brown
ANNIE STEVENS TUTTLE (1818-1863) m. Silas Hibbert Crane Newcomb
Silas had a stand of mills at Parrsboro, N.S.

WILLIAM TUTTLE (1803-1865) m. OLIVIA ROBLEE PEERS

William and Olivia were married on June 28, 1828 in Wallace by D. M. McFarlane Esq. They lived in Wallace until 1853 then moved to Moncton, New Brunswick. They eventually settled in Salem in Cumberland County Nova Scotia and are buried in the old West Amherst Cemetery in Nova Scotia (just off the Trans-Canada highway on Route 6) with 2 of their children -- William Graham and Rebecca Peers. They had thirteen children.
HANNAH ELIZABETH TUTTLE (1829-1899) m. THOMAS KINREAD
(See the Kinraide line)
THOMAS ROBLEE TUTTLE (1831-1880) m. Elizabeth A. Fawcett
WILLIAM GRAHAM TUTTLE (1834-1910) m. ?
JOHN ALEXANDER TUTTLE (1836-1913) m. Sophia Embree
MARTHA ANNE TUTTLE (1839-1907) m. John Parkinson Pipes
MARY BOLDING TUTTLE (1841-) m. James William Black
JAMES BOLDING PEERS TUTTLE (1843-) m. Susan Embree and ?
(Susan and Sophia Embree were sisters)
JANE CELT TUTTLE (1845-) m. Matthew Duncan Pride and ?
Matthew Pride established, controlled and up to his death, managed the Amherst Boot and Shoe Company which for many years produced most of the work-boots used in the Maritime Provinces.
STEPHEN ISAAC HENRY TUTTLE (1847-) m. Adelia Fillmore
REBECCA PEERS TUTTLE (1850-1865)
ABRAHAM AKERLEY TUTTLE (1852-1913) m. Josephine Marie Higgins
Abraham established the firm of Tuttle Bros., casket manufactures and undertakers in Moncton, NB
PETER TUTTLE (April 13, 1854 - April 17, 1854)
ROXANNA AMELIA TUTTLE (1857-1859)

PEERS

ALEXANDER PEERS (174-1816) and MARY BOLDING (1745-1808) were married Sept. 15, 1766. According to Alexander's account before the Royal Commisson on Loyalist claims, in 1775 he was living, as a farmer, on the Phillips Manor estate in Dutchness County, New York. The Phillips manor was built of oak about 1680 and has stood for over 300 years near the mouth of the Pocantico River also known as the "Sleepy Hollow Brook" of Rip Van Winkle fame. Mary Bolding's mother was Mary Howard of North Carolina. Alexander served as a private during the Revolution. Mrs. Peers and the children were driven back of the British lines early in the conflict. Alexander and Mary eventually settled in Wallace Bay with their eight children.

EZEKIEL PEERS (1766-) m. Mary Teed Carnell
EPHRAIM PEERS (1767-1843) m. Patience Horton
Ephraim was the first school teacher in Wallace of whom we have any record
JOHN PEERS (1769-) m. HANNAH ROBLEE
JERUSHA PEERS (1772-) m. Daniel Teed
DANIEL PEERS (1774-1843) m. Mary Sweeney
ELIZABETH PEERS (1774-1843) m. WILLIAM TUTTLE
(see Tuttles)
MARY PEERS JR. (1780-1781)
? (1781-)

JOHN PEERS married HANNAH ROBLEE (-1820) daughter of John Roblee (~1740-1810) from Westchester County, New York. They settled near the south shore of Wallace Bay and raised six children. They are buried in the North Wallace Cemetery.

ALEXANDER PEERS (1795-1820)
WILLIAM PEERS (1797-1822)
HANNAH PEERS (1798-1817) m. Knapp Forshner
DANIEL PEERS (1800-1870) m. Rebecca Pineo and Phoebe Seaman
ZILLAH PEERS (1804-1880) m Abraham Akerley
OLIVIA ROBLEE PEERS (1812-1874) m. WILLIAM TUTTLE
(see Tuttles)

Some tourist, seeing some Great Blue Heron in the Wallace Bay, asked what they were. An ancient resident answered "Oh, they're Peers." The Peers family were all tall between 6 feet and 6 feet 6 inches.

FORD

According to the "The National Cyclopaedia" in an article about Henry Jones Ford, the founder of the Ford family in America came from England about 1650 and settled in St. Mary's County, Maryland, the first ancestor of record being JOHN FORD.

FRANKLIN FORD (1822-1860) married ANNIE ELIZABETH JONES (1830-) on 13 November 1850 in Baltimore, Maryland. Annie was the seventh and last child of URIAH JONES (1788-1860) and ANNA MINCHNER (1788-) Franklin is listed in the 1850 census as a merchant. Annie's father Uriah is listed in the same census as a tobacconist.

Franklin was a wholesale flour merchant. Franklin and Annie had four children:

HENRY J. FORD (25 Aug 1851 - 19 Aug 1925) m. Bertha or Martha
Henry was a journalist for several newspapers until 1905. He then taught at John Hopkins University and Princeton. After the age of 60 he wrote several historical books.
ROBERT H. FORD (Dec 1853 - May 1892) m. Rachel A. Sugg
ANNA U. FORD (1856-)
FRANKLIN FORD (1859 - 30 Jul 1860)

ROBERT H. FORD married RACHAEL A. SUGG (25 May 1856 - 20 Feb 1922) on 22 Feb 1888 in Camden, New Jersey. Rachel was born in Wilmore, Kentucky as the second daughter of COL THOMAS SUGG and MARTHA EDMONDSON (see Sugg). Robert and Rachel had one child:

ETHEL SUGG FORD (13 April 1888 - 14 May 1933) m.
1) THOMAS BURTON KINRAIDE (see Kinraides)
2) WILLIAM S. CASPERSON

Robert was a newspaperman. During the blizzard of 1888 he was snowbound between New York and Philadelphia while Ethel was being born in Philadelphia. Robert committed suicide by taking morphine in Denver, Colorado in May of 1891 after becoming depressed by a strained financial condition. Robert and Rachel Ford are buried in West Laurel Hill Cemetery, Pennsylvania.

WILLIAM THOMAS CASPERSON (5 Jul 1877 - 29 Oct 1945) married ETHEL SUGG FORD on 10 October 1927 in Newtonville, Massachusetts. William came from Greenwich Township, New Jersey as the only son of THOMAS G. CASPERSON, JR. (1841-1869) and JULIA LACLARE P. FERRELL (1843-) Will and Ethel divided their year between Newtonville and Sandwich. They had one daughter and a stillborn son:

JULIA CLAIRE CASPERSON (2 Feb 1933 -) m. WILLIAM RODNEY HENDY, JR.
WILLIAM K. CASPERSON (28 Apr 1930)

Ethel died of septicemia resulting from a bladder infection.

SUGG

THOMAS SUGG (~1800-1880) married MARTHA EDMONDSON (1815-). Thomas was probably born in Devonshire, England. Thomas and Martha were married on 3 June 1852 in Indiana. Thomas was a boot and shoe maker. Martha was a Seamstress who came from Scott County Kentucky and had lived with the Shakers. They had three daughters all born in Kentucky:

MARY E. (M.) SUGG (25 Feb 1854 - 20 Feb 1902) m. Edward W. Pepper
Edward fought in the Civil War. In the 1900 census he is listed as living in Philadelphia ward 30 with his wife Mary. Edward was age 52, married 25 years and a lettercarrier.

RACHEL A. (H.) SUGG (25 May 1856 - 20 Feb 1922) m. ROBERT H. FORD
In addition to Ethel Sugg Ford, Rachel also had an illigitimate child named Walter brought up by the Fosters.

SARAH (SALLIE) D. SUGG (20 June 1857-~1910) m. James B. Gaines

During Martha Edmondson's first marriage (before Thomas) she had a child Josephine who married Joseph B. Geers Sr. He disappeared in the Civil War. Their daughter Betty Francis married Walter Yarwood. Fannie and Walter's youngest daughter was Alice V. Yarwood who married Arthur Draving.

Sarah Sugg and James B. Gaines had three daughters.

NAN GAINES (1877-) made cinnamon buns
MAGGIE GAINES (1880-)
MAMMIE GAINES (1883-) m. William Casperson
(before he married Ethel Sugg Ford)

James Gaines abandoned the family in 1885. Sarah was living in Greenwich, Gloucester County, New Jersey in 1900 with one living child.

John Kinread m. Isobel Gawn July 1 1781 in Male

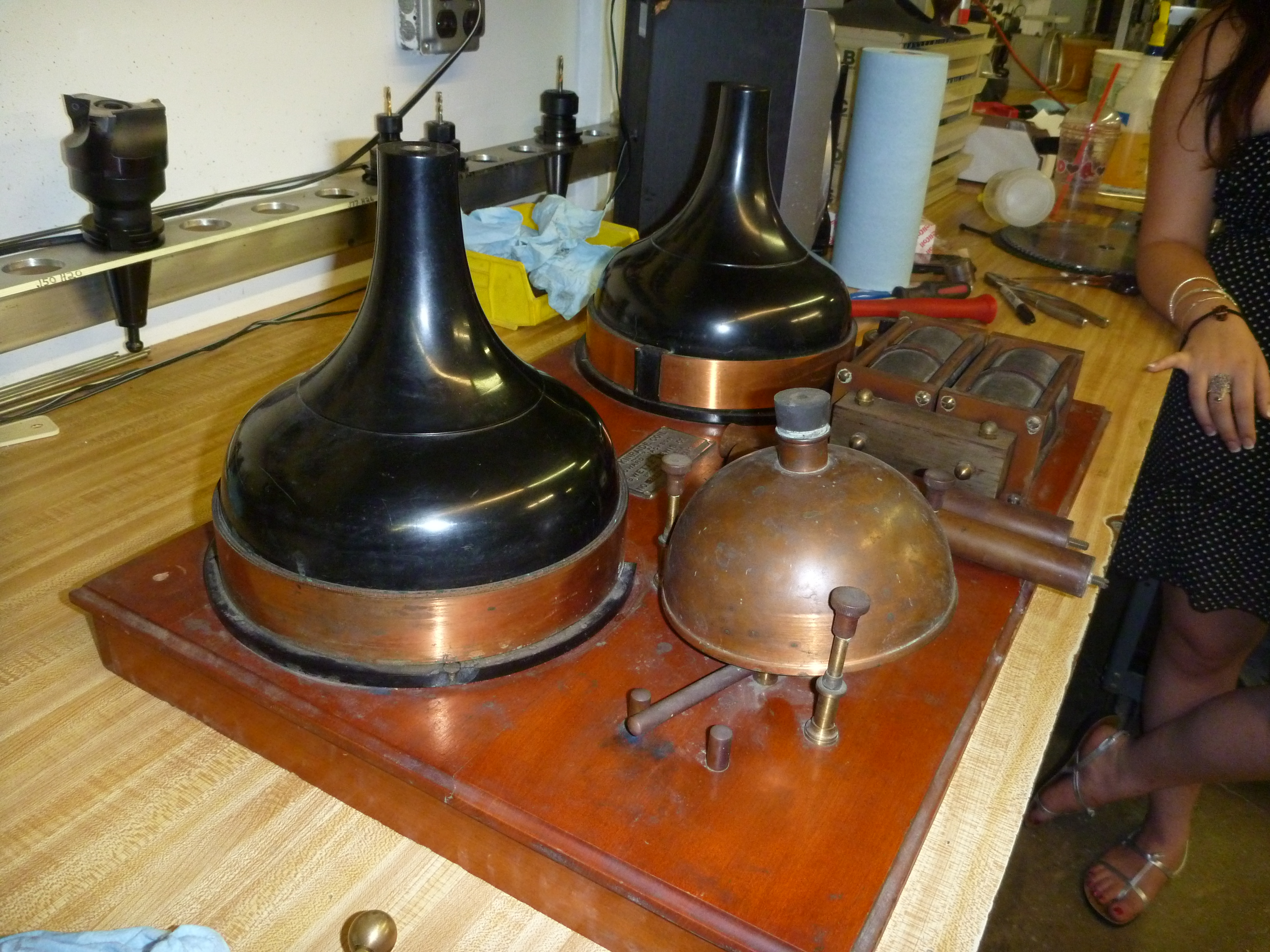
George Kinread born to John + Isabel - christened on
May 5 1782 in Malew

275

2 BAGS
Honey Nut
Cheerios

THE KINRAIDE COIL
MADE BY
HOWARD JACKSON
SWETT & LEWIS CO.
BOSTON MASS. U.S.A.
NO. V CYCLES
PATENTED

DO NOT RAISE WINDO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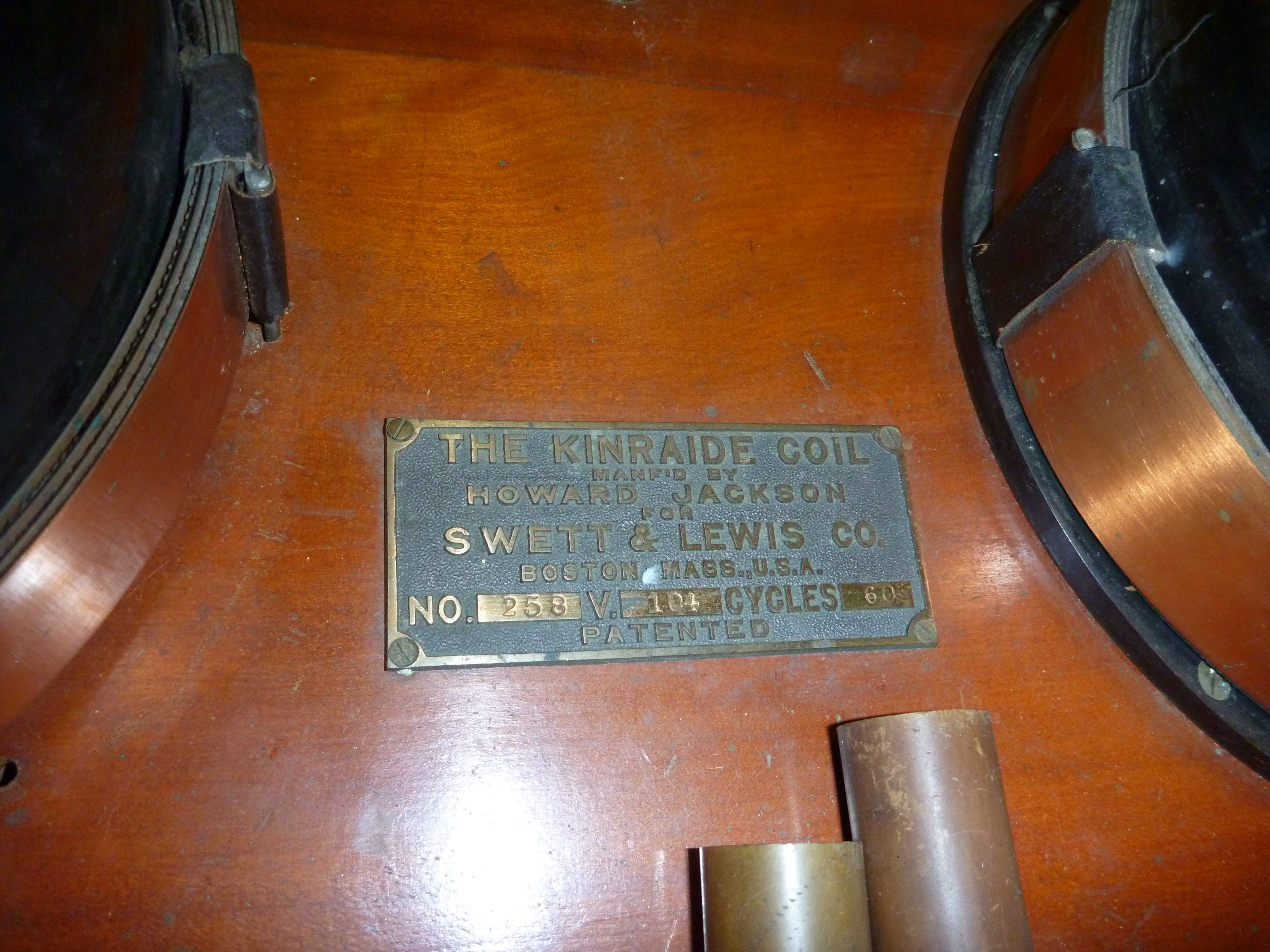
THE KINRAIDE COIL
MANF'D BY
HOWARD JACKSON
FOR
SWETT & LEWIS CO.
BOSTON MASS., U.S.A.
NO. 258 V. 104 CYCLES 60
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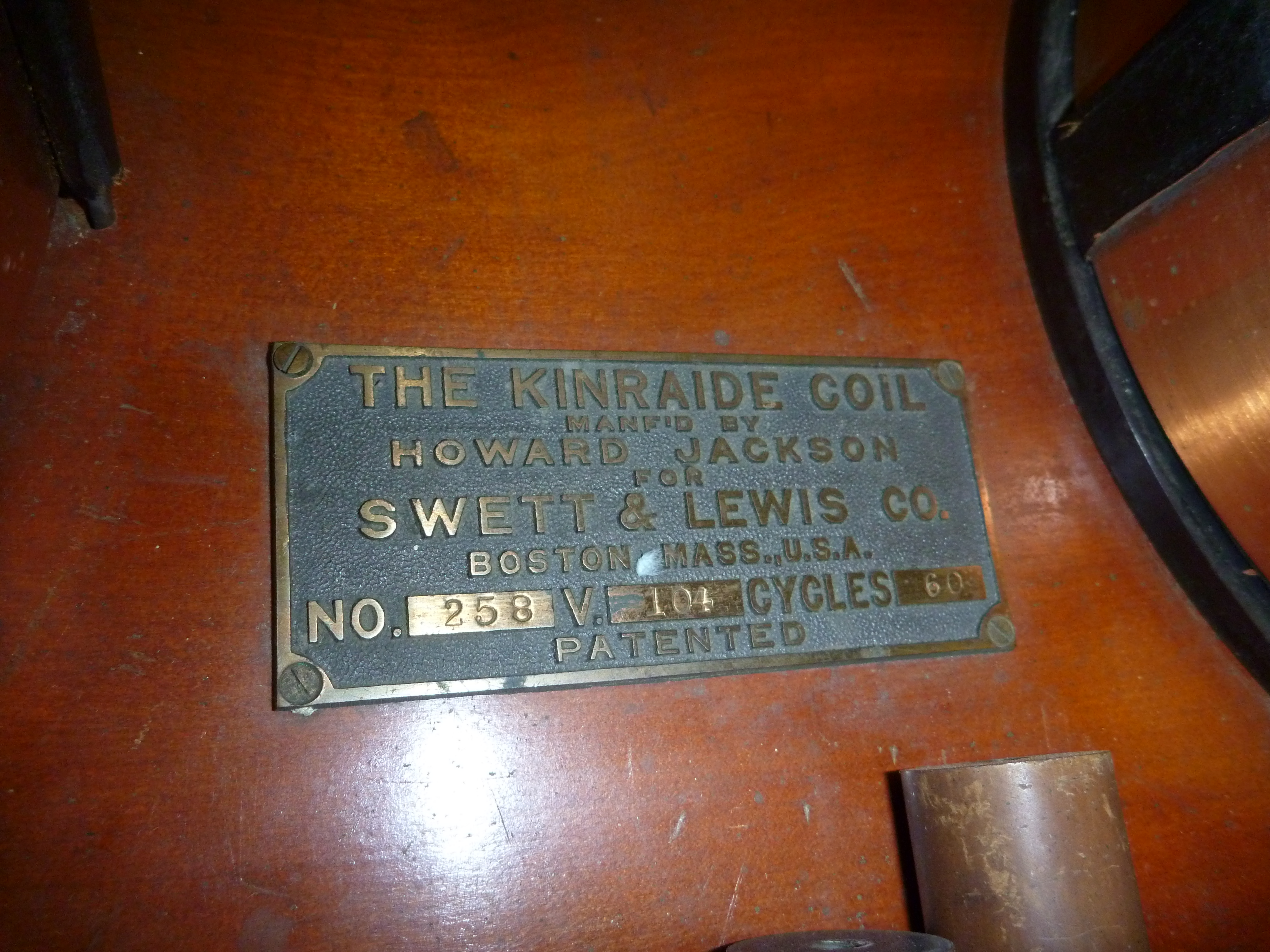
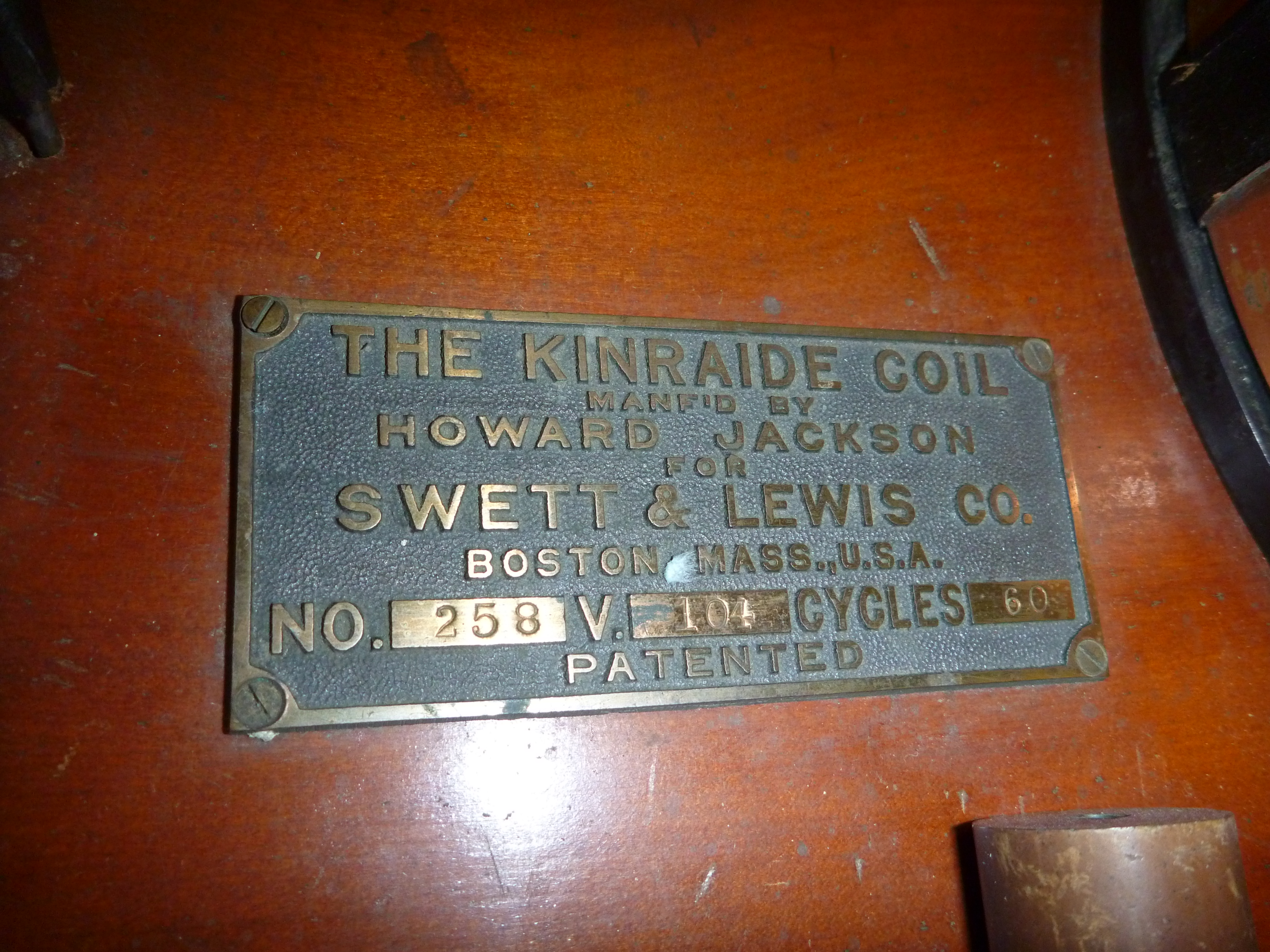

THE KINRAIDE COIL
MANF'D BY
HOWARD JACKSON
FOR
SWETT & LEWIS CO.
BOSTON, MASS., U.S.A.
NO. 258 V. 104 CYCLES 60
PATENTED



THE KINRAIDE COIL
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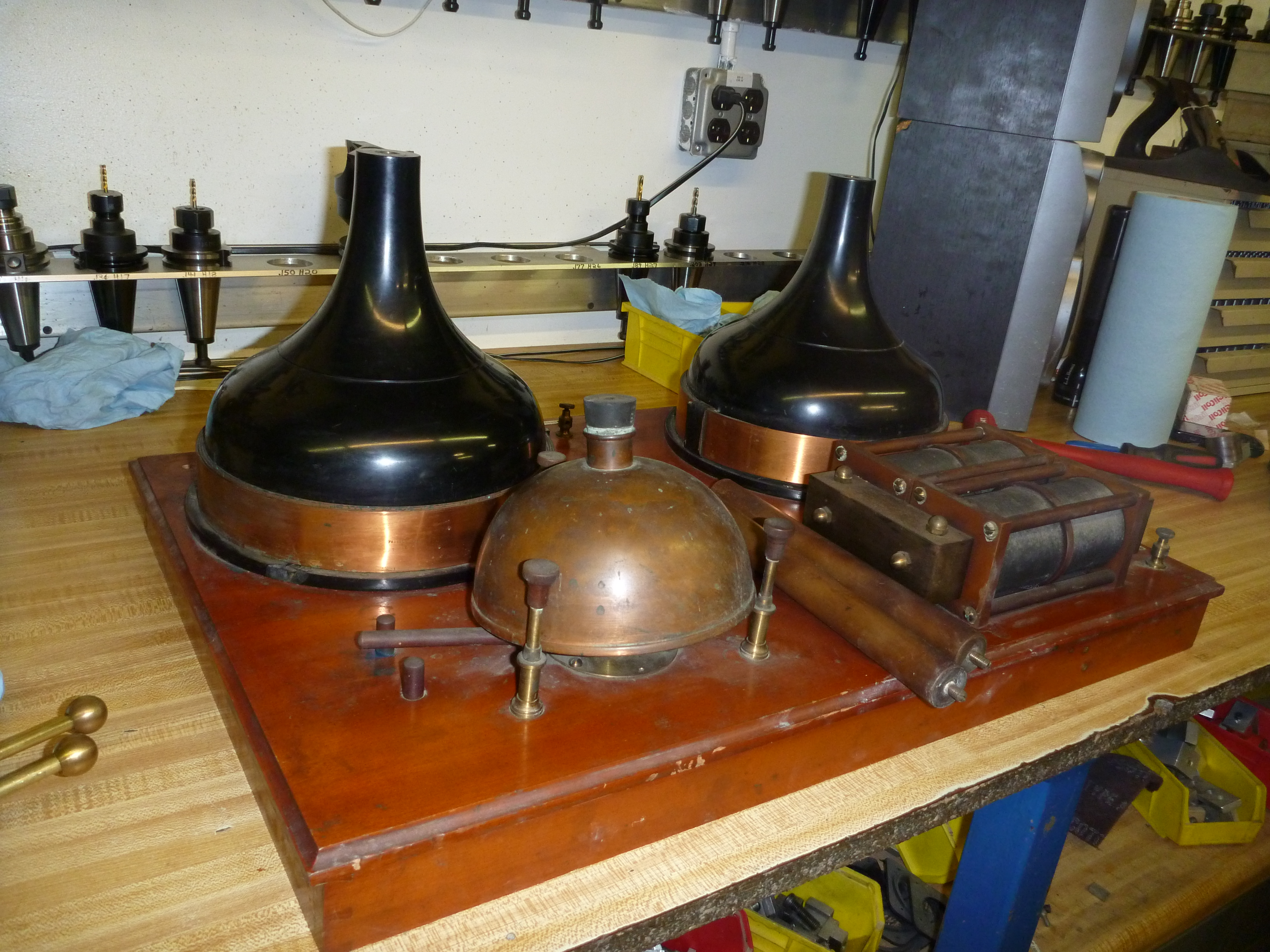
BOSTON, MASS., U.S.A.
NO. 258 V. 104 CYCLES 60
PATENTED



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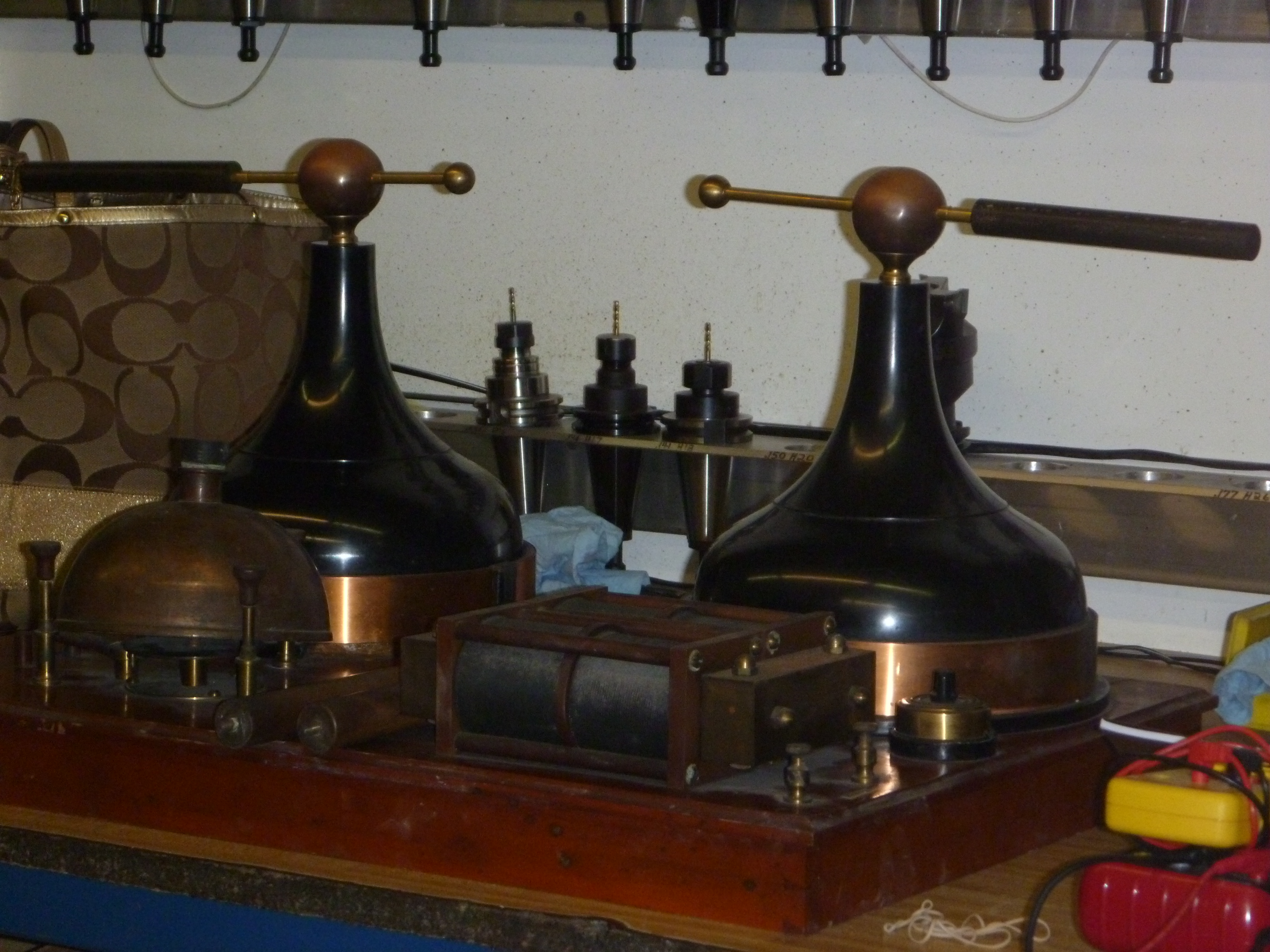
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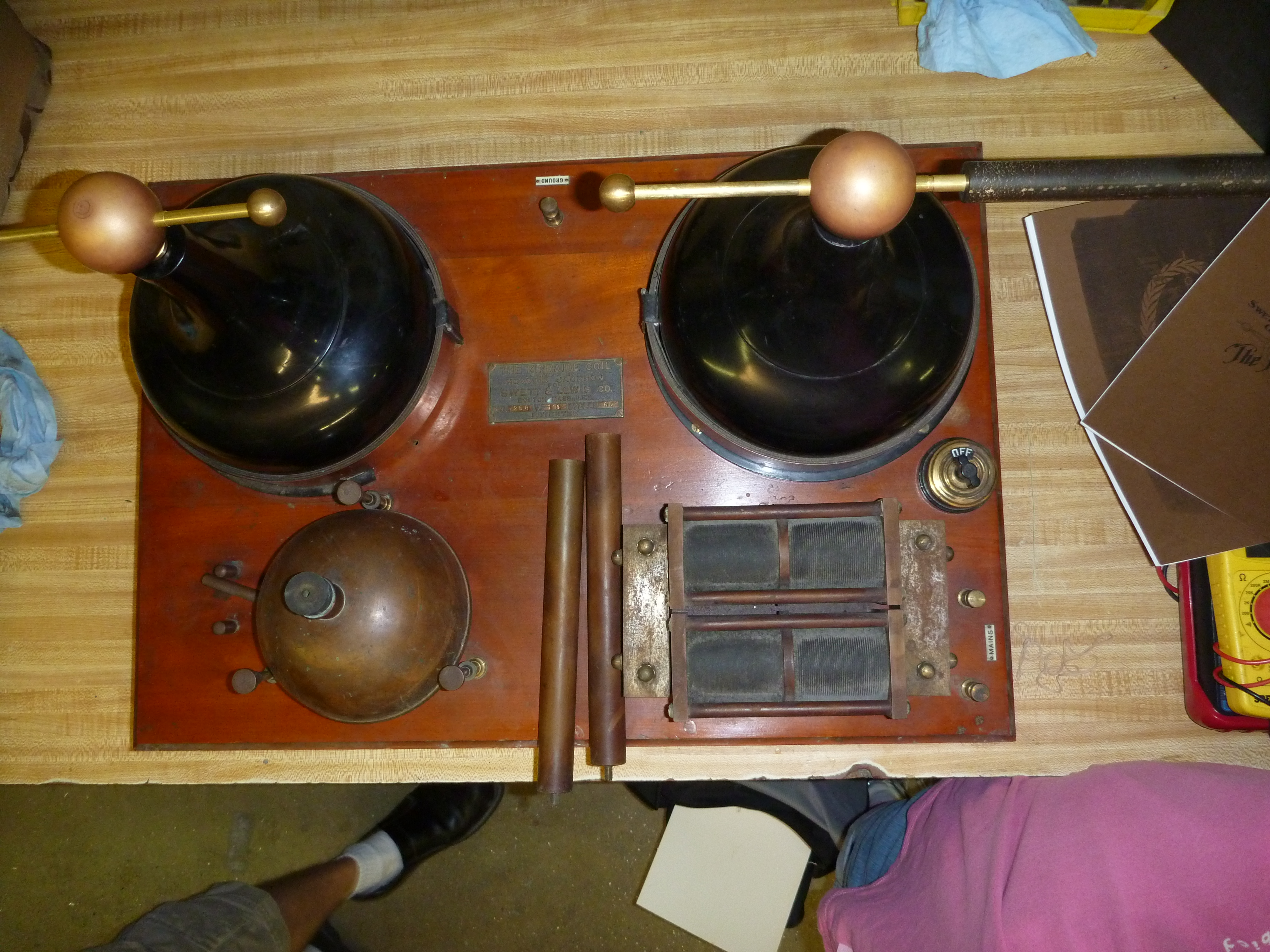
GROUND
THE KINRAIDE COIL
MANF'D BY
HOWARD JACKSON
FOR
SWETT & LEWIS CO.
BOSTON, MASS., U.S.A.
NO. 258 V. 104 CYCLES 60
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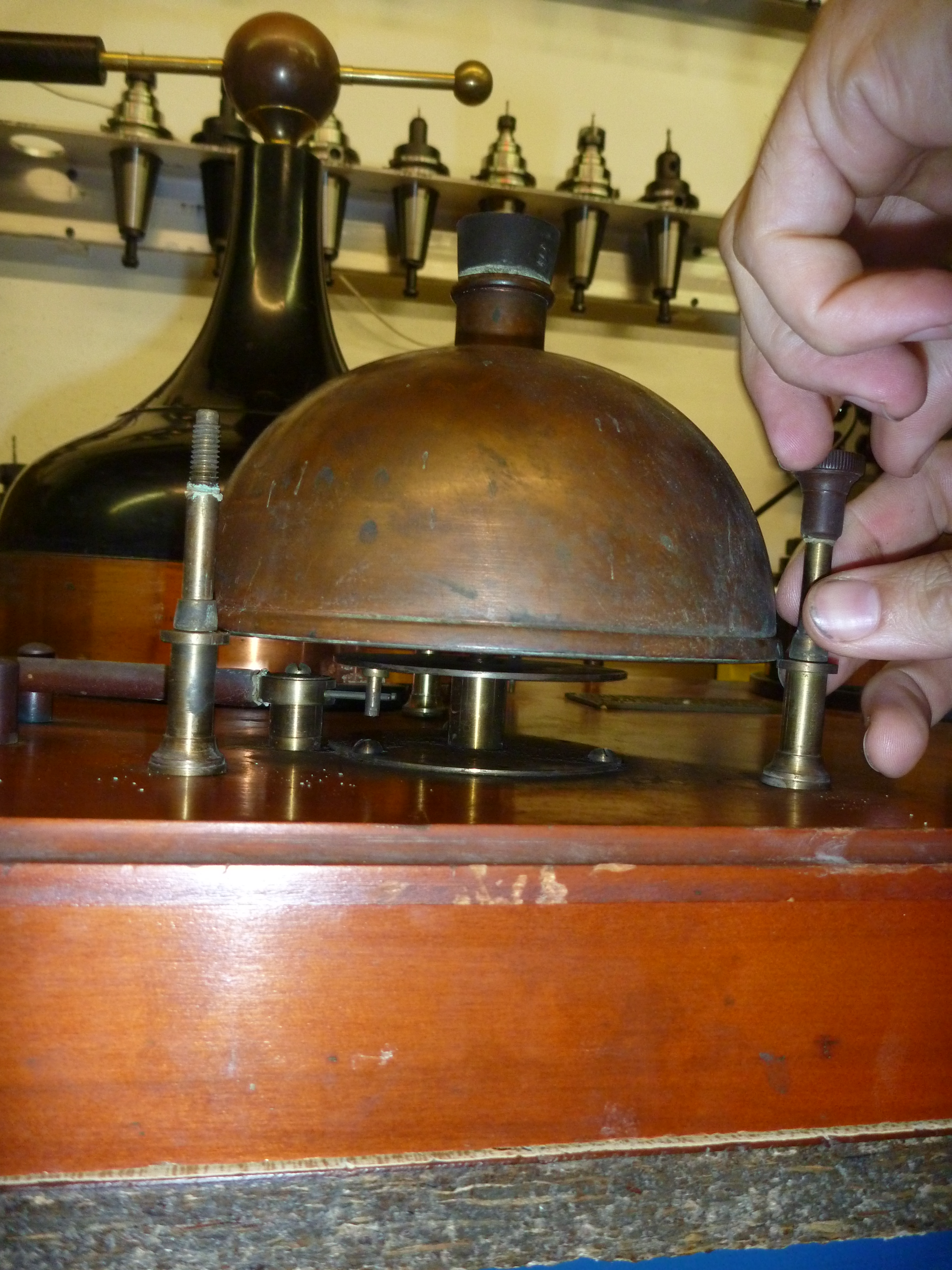

CRAFTSMAN
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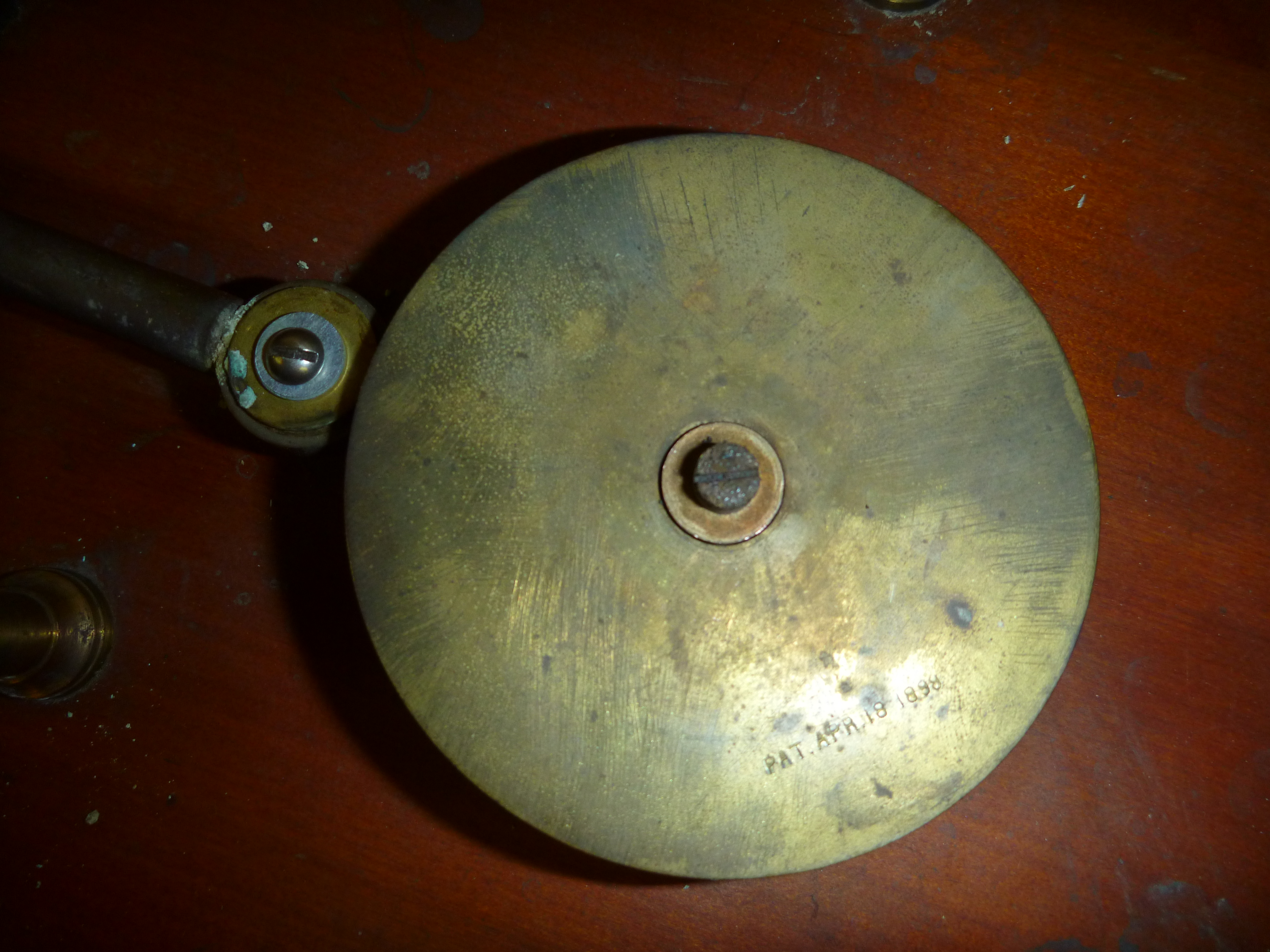
PAT. APR. 18 1898

THE HA & HEGEMAN MFG CO
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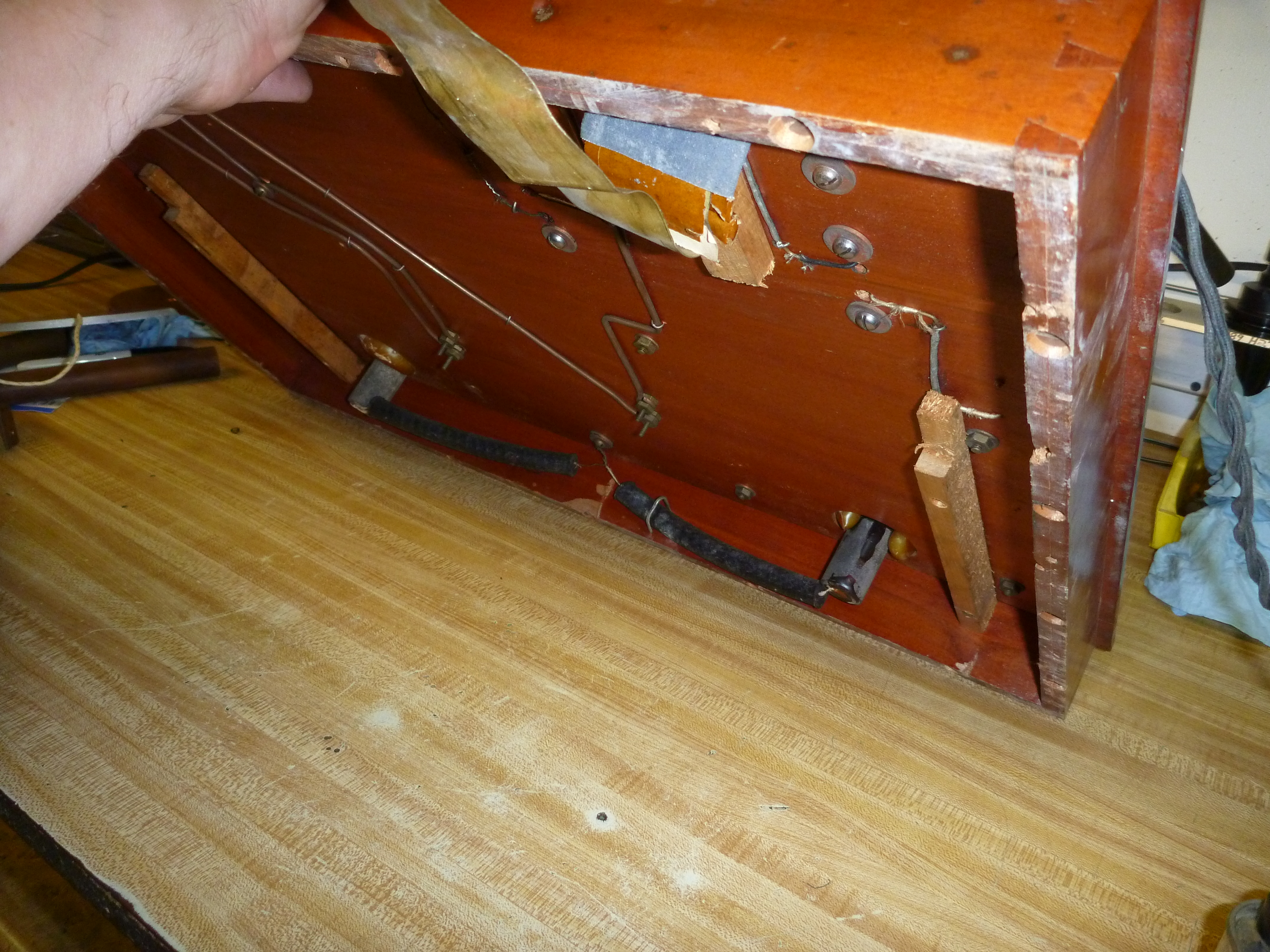
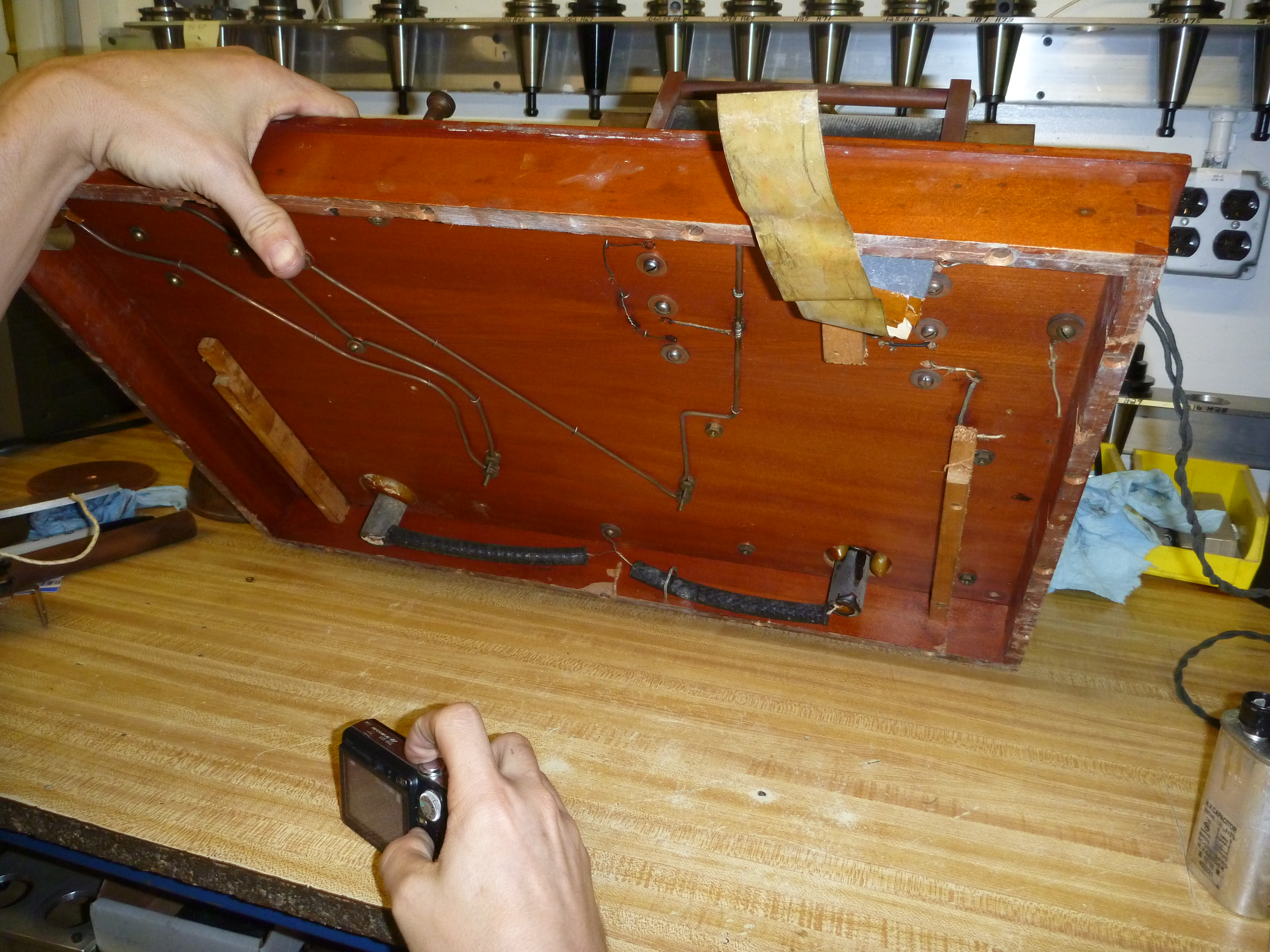
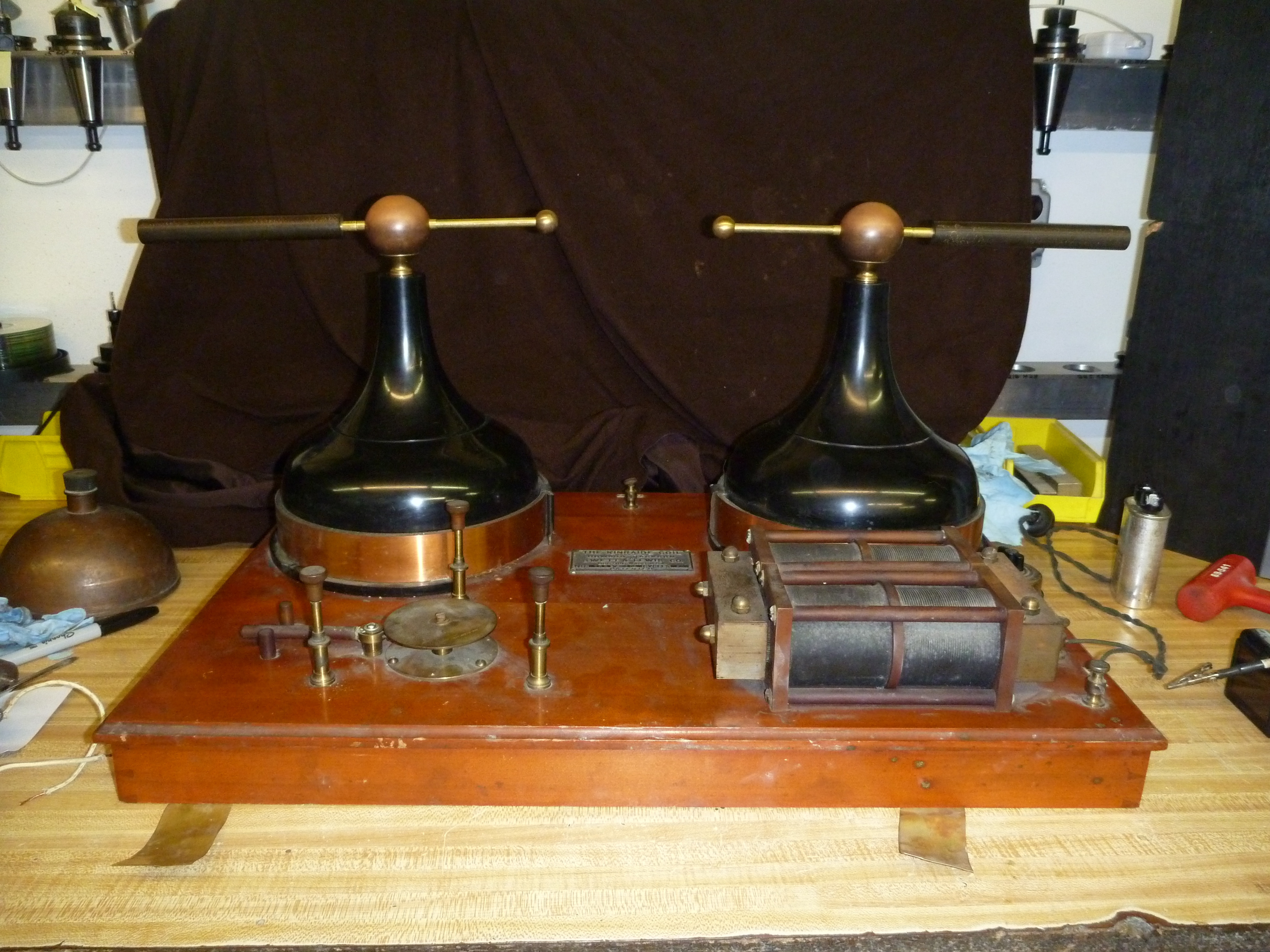
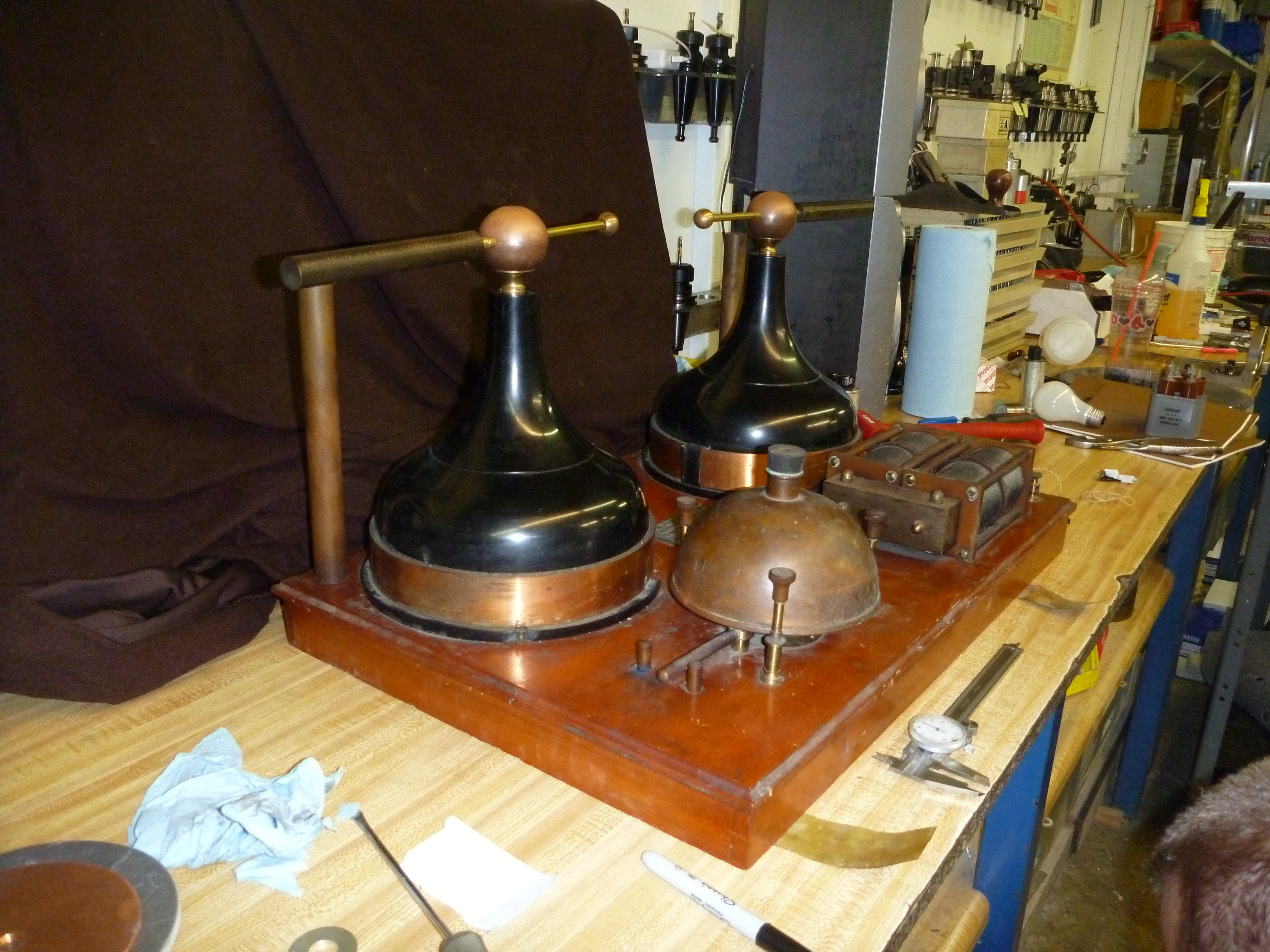




I want to ride my bicycle


THE KINRAIDE COIL
SWETT & LEWIS CO.
CYCLES



MAINS

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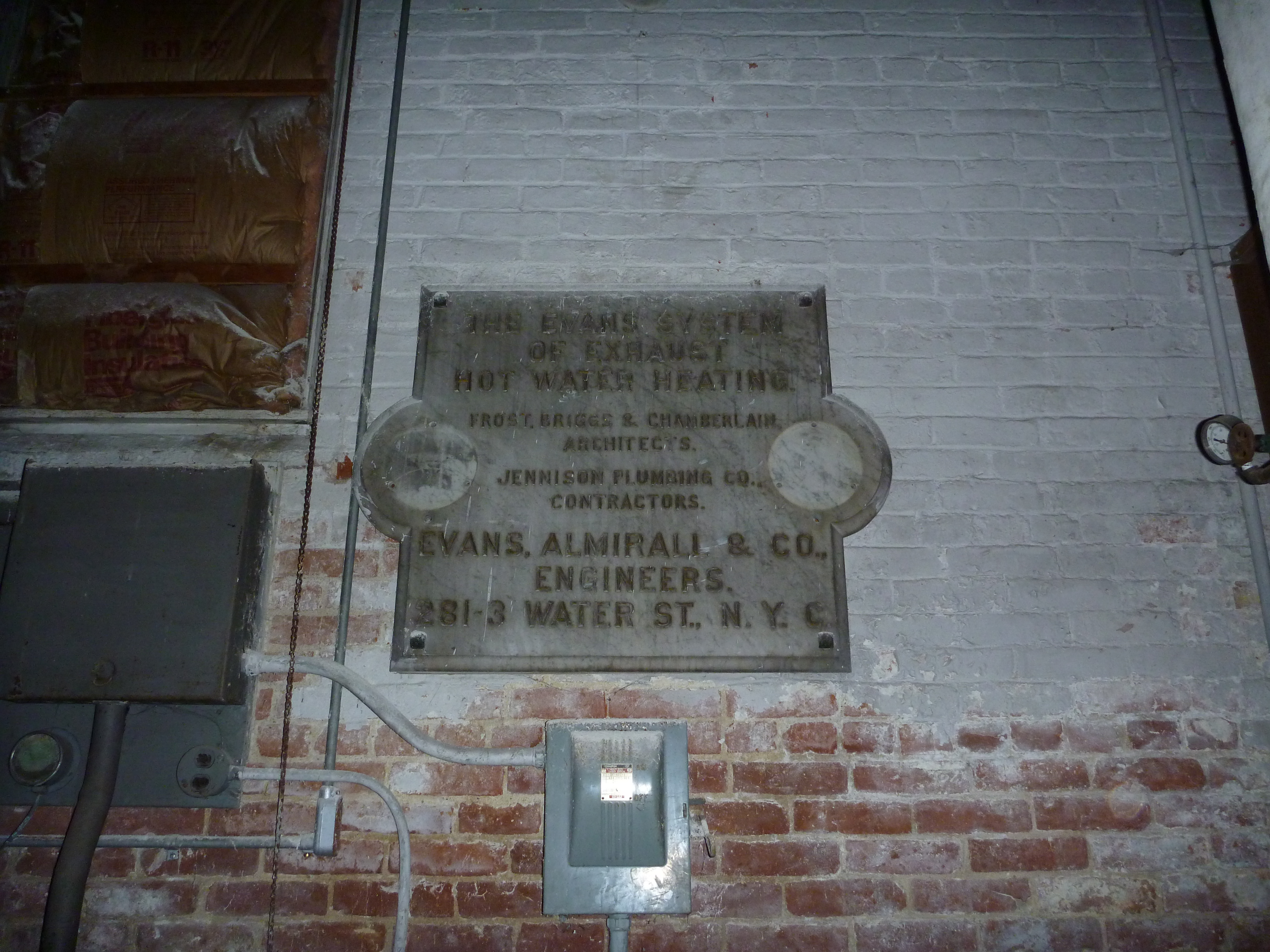
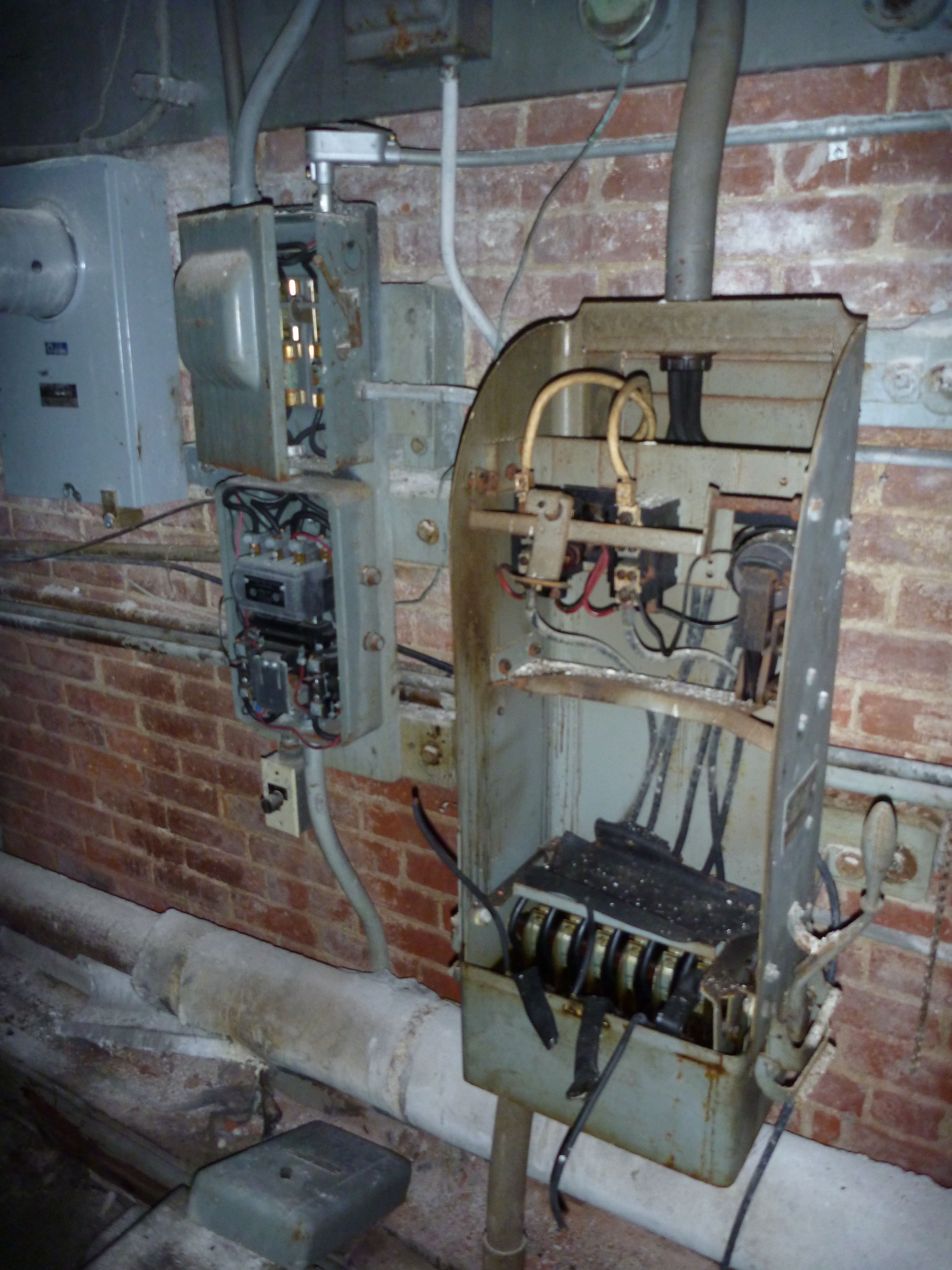
DIVIDE ET IMPERA


THE EVANS SYSTEM
OF EXHAUST
HOT WATER HEATING.
FROST, BRIGGS & CHAMBERLAIN,
ARCHITECTS.
JENNISON PLUMBING CO.,
CONTRACTORS.
EVANS, ALMIRALL & CO.,
ENGINEERS.
281-3 WATER ST., N. Y. C.



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PUSH REWIND
CARTER J.H.
3
AMPRO STYLIST
SERIAL NO.

TODAY
Teacher Action
reporter
Now More Than 900,000 Readers
The Common
Meeting Place for Education in New England
Education Faces Growing Crises Outside Field
Power Shifts to Taxpayers, Courts, Legislatures
Page 6
Page 7
Page 10
Page 12
INSIDE
nea
SO THIS IS PARIS
SO THIS IS PARIS

MTA TODAY
Fund MCCC contract, MTA Board insists
NO MORE ONE-WAY NEGOTIATIONS
Teacher Action
nea reporter
1st TRUMPET
SO THIS IS PARIS
MASTER SHEET
Now More Than 300,000 Readers
The Common
Meeting Place for Education in New England
Education Faces Growing Crises Outside Field
Power Shifts to Taxpayers, Courts, Legislatures
INSIDE
Page 6
Page 7
Page 10
Page 12
nea
SCHOOL COMMITTEE
SO THIS IS PARIS
MTA TODAY
New Hope For A Federal
Our Beautiful English Language

SKY HIGH
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FULLY ASSEMBLED BRANCHES
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2
THE AMPEG WILL NOT
WORK - NOTE! DO NOT
PLUG IN
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PATTI
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Knoxglass
DAIRY CONTAINERS
FRACTIONS

JOYCE
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FRACTIONS

BSV

TP
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3. Physical Chemistry in Physiology.
4. Cell Functions.
5. Blood.
6. Red Blood Corpuscles.
Vocabulaire et Exercices

First Year FRENCH

CENTRAL SCIENTIFIC CO.
LABORATORY SUPPLIES
CHICAGO, U.S.A.

CENTRAL SCIENTIFIC CO.
LABORATORY APPARATUS
CHICAGO, U.S.A.

CENTRAL SCIENTIFIC CO.
LABORATORY APPARATUS
CHICAGO U.S.A.

CENTRAL SCIENTIFIC CO.
LABORATORY APPARATUS
CHICAGO. U.S.A.

First-Year FRENCH
BEACON LIGHTS OF HISTORY
LORD

Knoxglass
DAIRY CONTAINERS
FRACTIONS

16

CARBON - "C" - ELEMENT OF LIFE
HITE
BL
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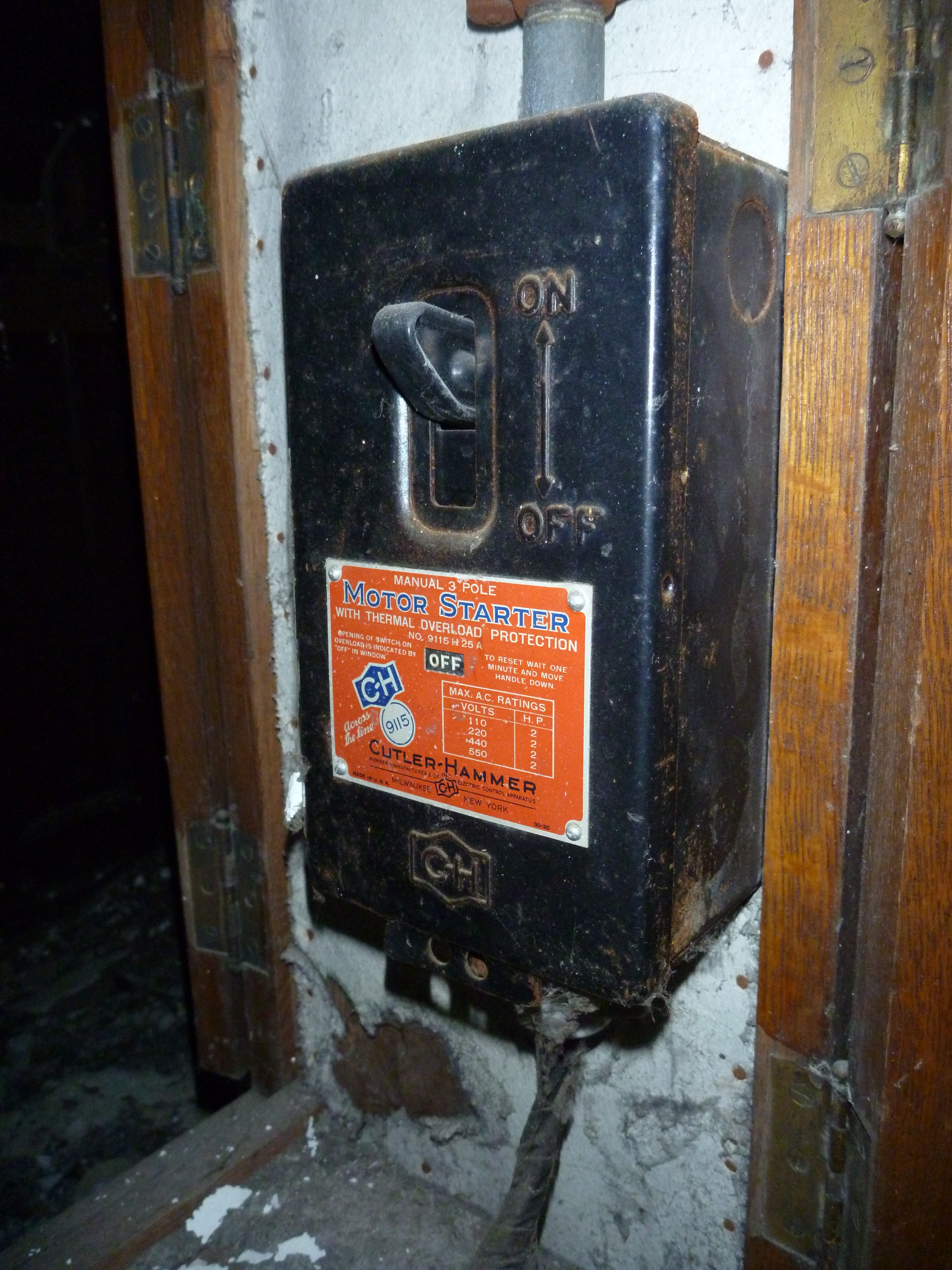
CELL
C

JAMES G. CARTER JUNIOR HIGH SCHOOL
WARNING
Parent or Guardian
to discuss ways to improve this situation.


ON
OFF
MANUAL 3 POLE
MOTOR STARTER
WITH THERMAL OVERLOAD PROTECTION
NO. 9115 H 25 A
OPENING OF SWITCH ON OVERLOAD IS INDICATED BY "OFF" IN WINDOW
OFF
TO RESET WAIT ONE MINUTE AND MOVE HANDLE DOWN
C-H
Across the line
9115
MAX. A.C. RATINGS
VOLTS
H. P.
110
220
440
550
2
2
2
2
CUTLER-HAMMER INC
PIONEER MANUFACTURERS OF ELECTRIC CONTROL APPARATUS
MADE IN U. S. A.
MILWAUKEE
C-H
NEW YORK
30-30
C-H

SENIOR HIGH SCHOOL

POWER
ABDICK
MAGNA SL
ABDICK

Two years have gone by, and I am one of the richest men in the city, and have no more money than will keep me alive.

Susan said I was half cracked like Uncle Philip, and broke off her engagement. In my despair I have advertised in the "Journal of Science," and have had absurd schemes sent me by the dozen. At last, as I talked too much about it, the thing became so well known that when I put the horror in a safe, in bank, I was promptly desired to withdraw it. I was in constant fear of burglars, and my landlady gave me notice to leave, because no one would stay in the house with that box. I am now advised to print my story and await advice from the ingenuity of the American mind.

I have moved into the suburbs and hidden the box and changed my name and my occupation. This I did to escape the curiosity of the reporters. I ought to say that when the government officials came to hear of my inheritance, they very reasonably desired to collect the succession tax on my uncle's estate.

I was delighted to assist them. I told the collector my story, and showed him Uncle Philip's letter. Then I offered him the key, and asked for time to get half a mile away. That man said he would think it over and come back later.

This is all I have to say. I have made a will and left my rubies to the Society for the Prevention of Human Vivisection. If any man thinks this account a joke or an invention, let him coldly imagine the situation:

Given an iron box, known to contain wealth, said to contain dynamite, arranged to explode when the key is used to unlock it—what would any sane man do? What would he advise?

CURIOUS ELECTRICAL FORMS.

AS SHOWN IN MR. T. BURTON KINRAIDE'S RECENT PHOTOGRAPHS OF ELECTRICAL DISCHARGES.

BY ANABEL PARKER.

THE remarkable photographs which it is the object of this article to explain constitute a graphic record, a genuine autobiography, of certain phases of one of the most wonderful and subtle of the great forces of nature. They are the result of several years of experimenting by a Boston investigator, T. Burton Kinraide, and are the record of impressions made upon sensitive plates by discharges of electricity. These photographs show the form and character of the so-called positive and negative phases of electric energy, and of a third phase which has never before been revealed. They hint at an apparatus unique in its delicacy of control. Beyond this, they throw fresh light on the very nature and character of this great force.

All the plates here shown were produced by discharges of minute quantities of electricity. From this point of view, they present a striking contrast to the plates published in THE CENTURY for June, 1900. Those were photographs of the phenomena resulting from discharges from electrical oscillators of great power. They recorded experiments made by that consummate genius of electrical investigation, Nikola Tesla, who delights in handling enormous quantities of electric energy.

By a cursory glance at the different plates and at the explanatory lines under them, it will be seen that whatever may be the outline of the entire design on the plate, there is one unvarying structural form for the positive phase and one for the negative. These are so dissimilar in character that they need never be confused. The positive phase has always the branching, fern-like structure which Mr. Kinraide calls filiciform, while the negative invariably shows the soft and feathery appearance which is well described as plumous. Whether the plate shows a single large disk composed of exquisitely delicate forms radiating from a center, or a series of zigzagging comets, one can readily tell by noting the structure whether the discharge which printed itself on the plate was in its positive or its negative phase.

This series of electrographs was, with a few exceptions, produced by means of a condenser apparatus, upon one surface of which the sensitive plate was placed. This surface can be electrified either positively or negatively at the will of the operator. Suppose it to be negatively electrified, and then touched at the center by a small brass sphere which is in connection with the positive terminal of the apparatus. The instant discharge from the sphere rushes out in all directions over the surface of the plate, and there is produced the beautiful figure shown in Plate I. Suppose, on the other hand, that the condenser surface on which the sensitive plate rests is positively electrified, and that a brass sphere connected with the negative terminal be brought in contact with it. The energy is gathered up, as it were, from the plate, and rushing toward the conducting sphere, leaves on the surface the print of its vanishing footsteps, as in Plate II.

With one or two exceptions, all the plates here shown are based upon the existence of these two sets of conditions, i.e., a surface negatively electrified brought in contact with a positive terminal, and a surface positively electrified brought in contact with a negative terminal. The terminal may be connected with a single sphere, as already suggested, with a roller, or with tiny metallic balls or needle-points. The deft manipulation of these mechanical devices produces the variety of design. The plates which were produced under conditions other than these will be noted farther on.

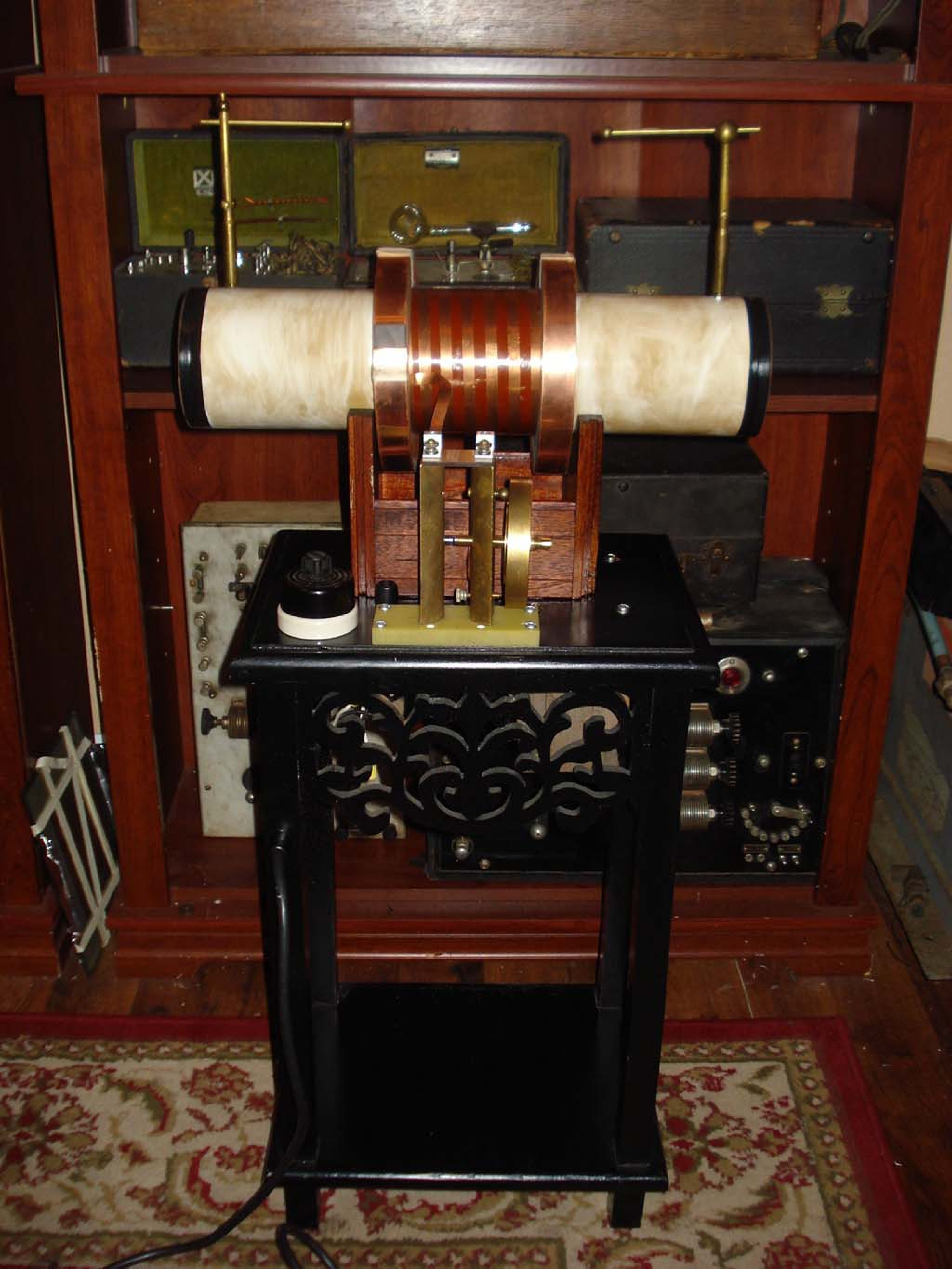
It is now five years since Mr. Kinraide made the happy discovery which led him to experiment along the lines of electrical photography of which these beautiful plates are the result. The apparatus he at first used was quite unlike the one he is now using, and was without the condenser plates. Many of the results that can be obtained from the one now in use he was unable to obtain by means of the former, but untiring efforts to discover the causes of his failures finally brought a knowledge that enabled him to construct an apparatus capable of producing the perfect plates here shown. As in many other instances, failure lighted the way to success.

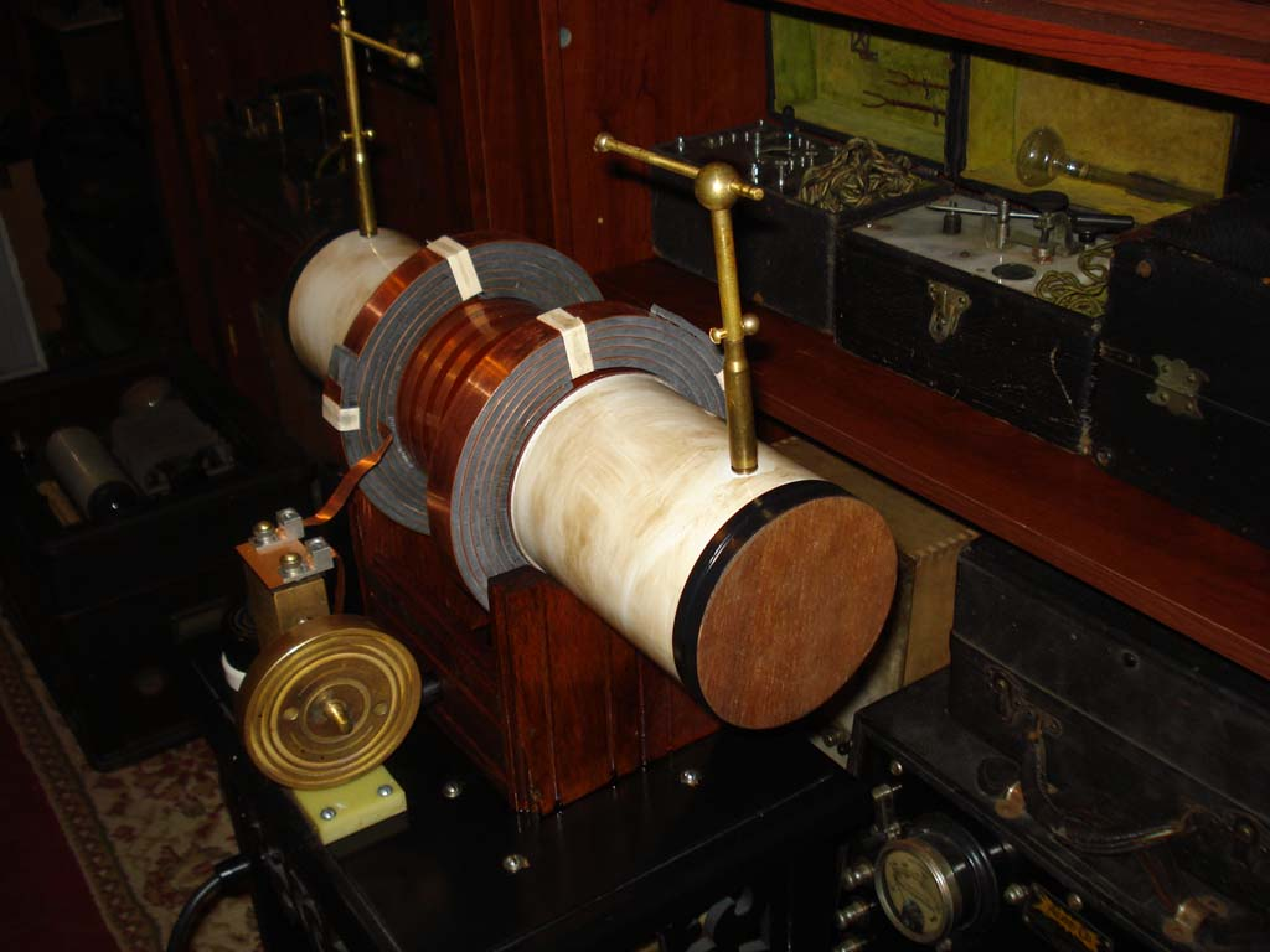
It is necessary to touch briefly on the construction of the apparatus and on the experiments carried on by means of it in order to give a clear idea of the way in which Mr. Kinraide has arrived at certain important conclusions. The apparatus has, as an interesting feature, a unique kind of secondary induction-coil consisting of a circular disk of fine wire wound in about one thousand turns. The peculiarity of this coil is that it will discharge out into the air as easily as the Ruhmkorff coil discharges toward its other terminal. In other words, the electric energy, instead of discharging from two equal potential terminals, as is the case where the Ruhmkorff coil is used, passes into the air almost wholly from one terminal. The non-discharging terminal is connected to an earth-wire, and thus its influence is entirely removed. The coil has a superb insulation, and will easily withstand a pressure under which the Ruhmkorff coil splinters to atoms. Thus the apparatus controls a higher voltage for the quantity than any other so far made.

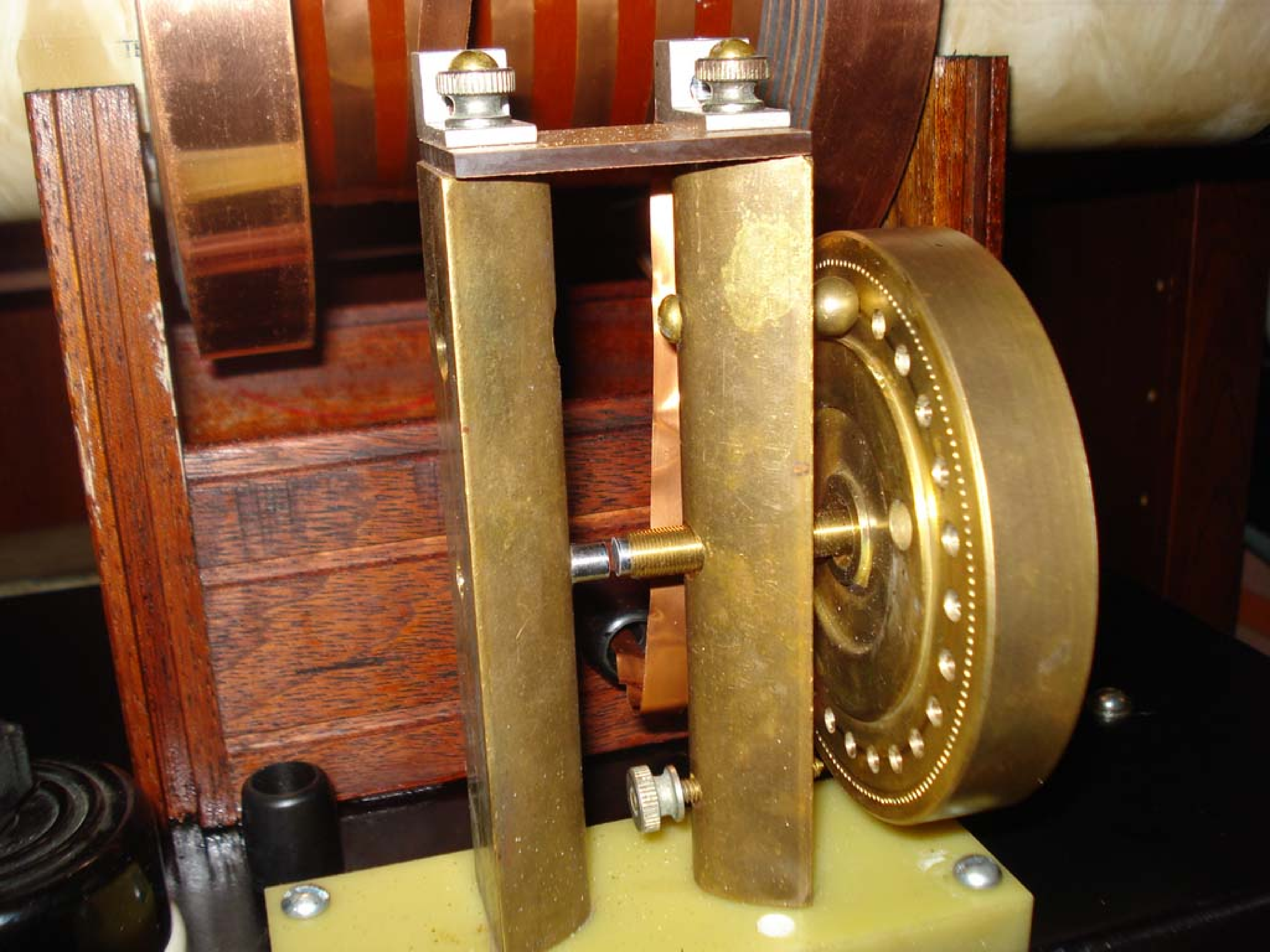
It was while studying the discharge from this apparatus in the dark that Mr. Kinraide noticed peculiar, fern-like forms of a pale violet color radiating from the two-inch brass sphere which formed the discharging terminal. By manipulating the discharge, he could make a number of these beautiful, quivering forms appear. By using spheres of larger diameters and increasing the potential, he could increase the length and size of the light-forms until they would shoot out thirty inches beyond the sphere and reach an apparent thickness of half an inch. They looked like miniature forks of violet-tinged lightning, cleaving the darkness of the laboratory. By balancing an ordinary photographic plate on the top of the spherical terminal, film side down, and opening and closing the circuit once, a photograph of the quivering light-forms was secured. They recorded themselves as the filiciform or positive phase of electric energy. This was a first effort, and a first success.

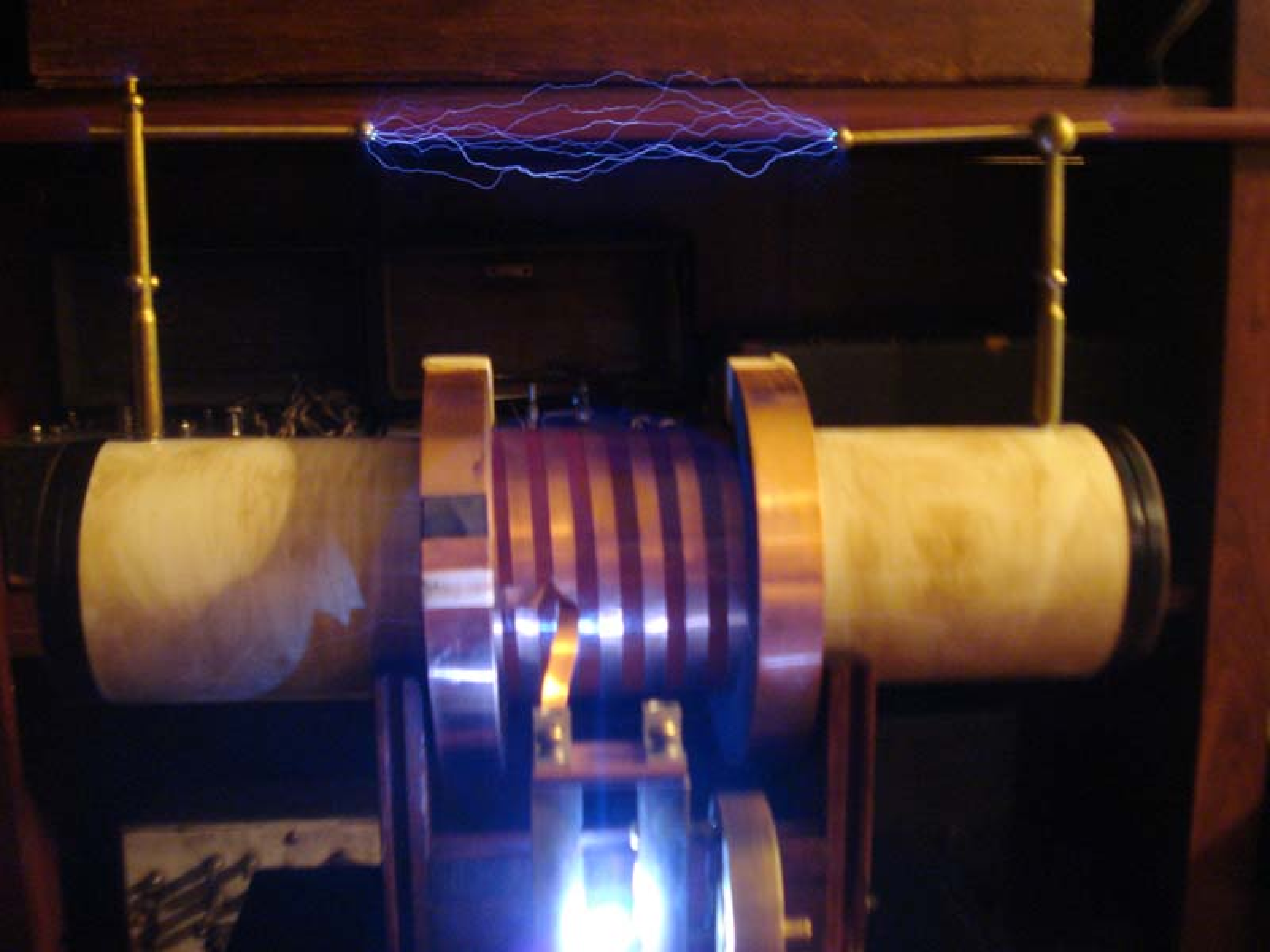
Upon a reversal of the current, an entirely different phenomenon was observed. Instead of the branching outshoots of violet light, there appeared plume-like forms resembling the cattail of the meadow-flag. These seemed to be about an inch in diameter and seven inches long. An attempt to secure a photograph of these plume-like forms was made, but though the plate was as carefully adjusted and the current as skillfully manipulated as before, there was no record found upon the plate when it was developed. The experiment was repeated again and again, but with disheartening results. The plumous forms could not be induced to make any impression on the sensitive plates. For two years Mr. Kinraide experimented, sacrificing plates enough to build a greenhouse. Then he made a discovery. The plumous

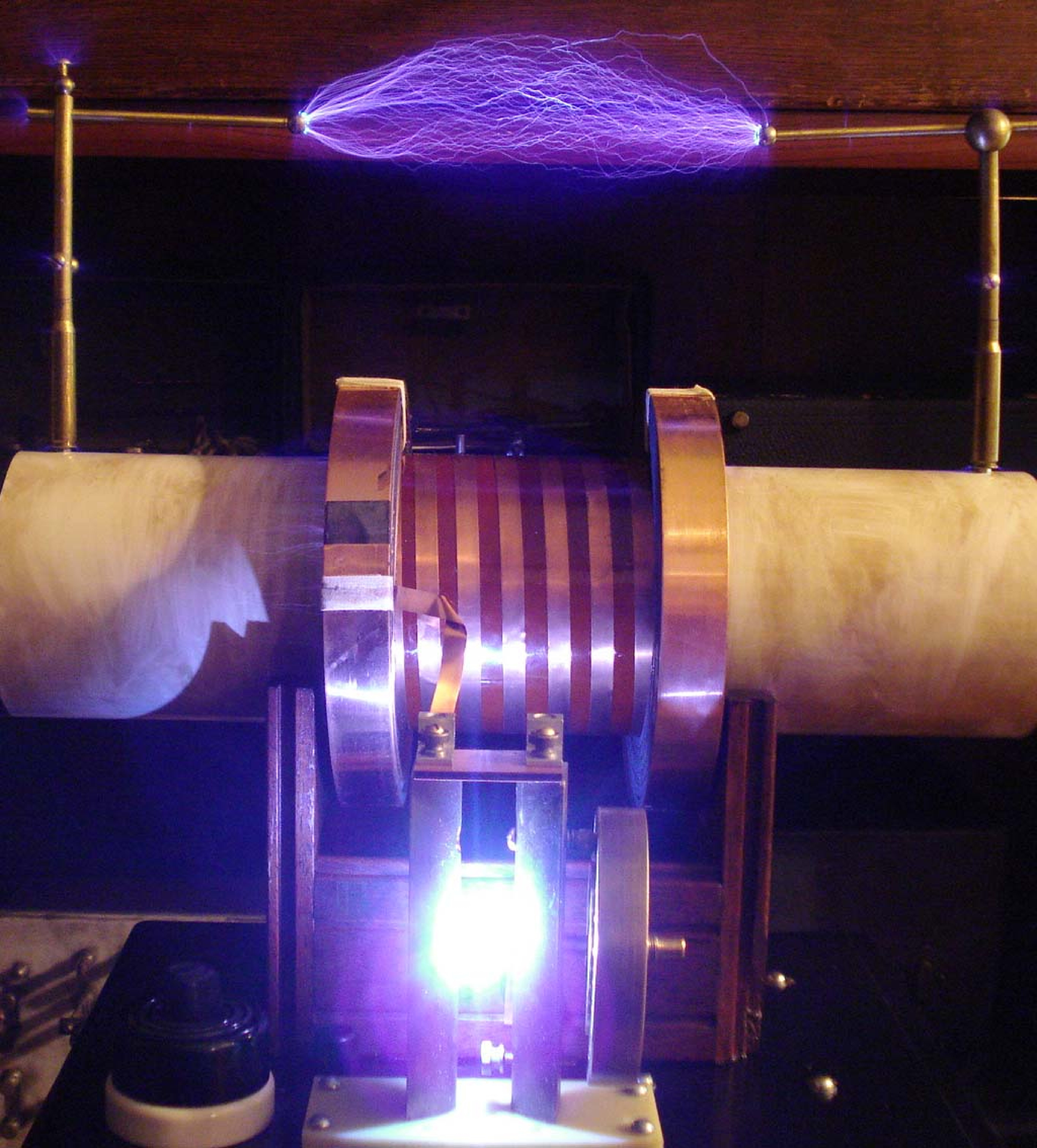
AirTech

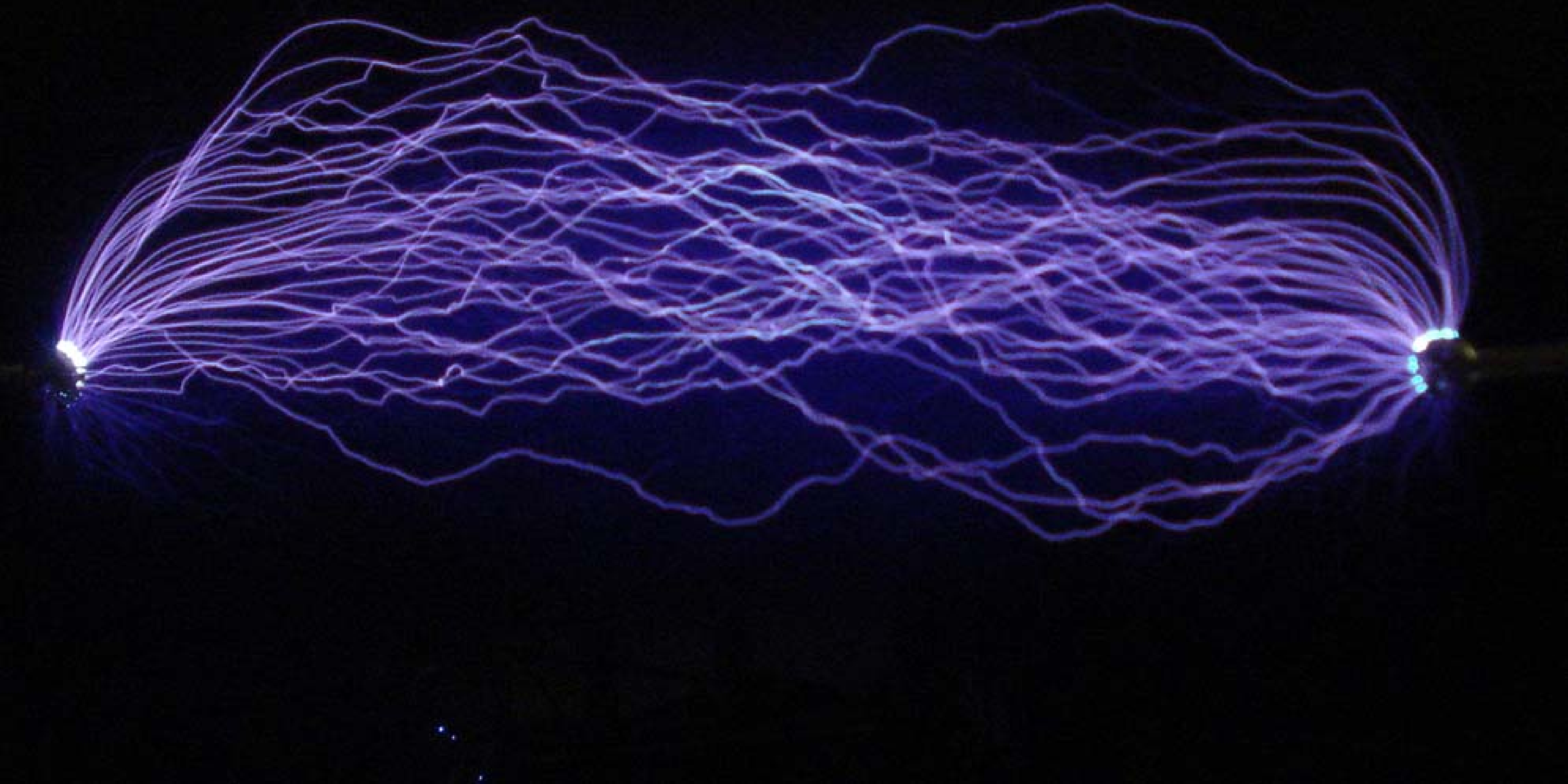


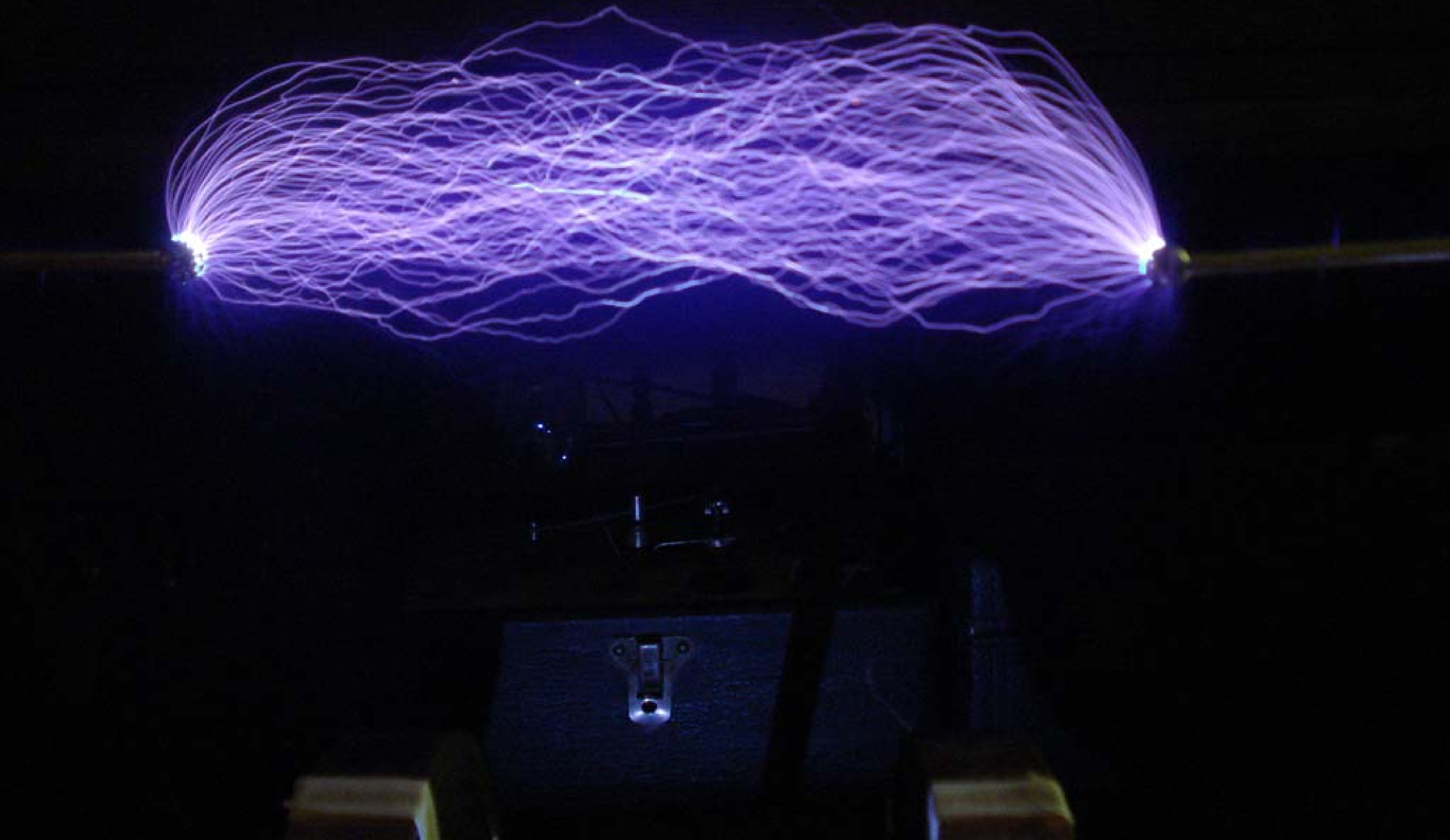


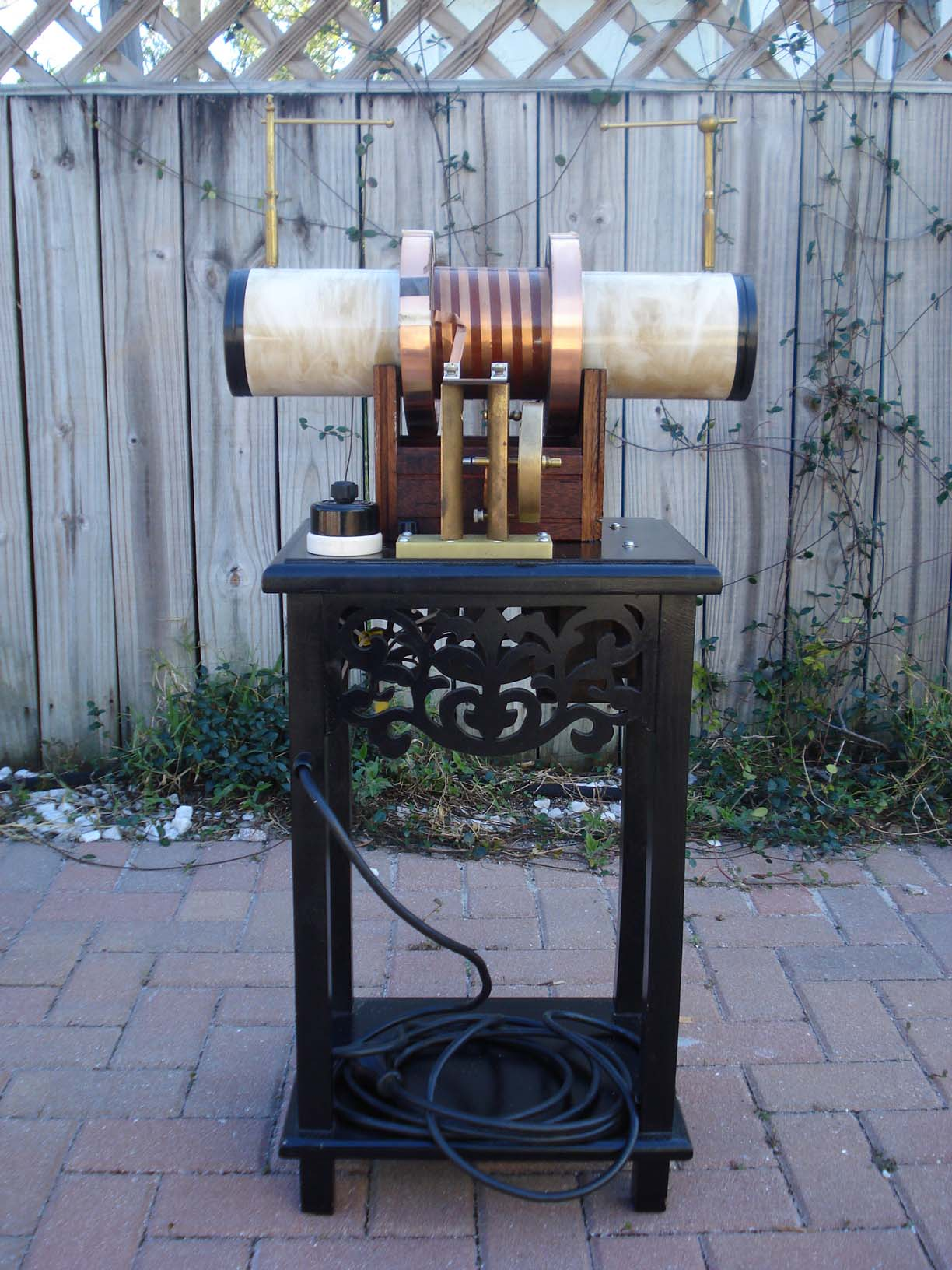


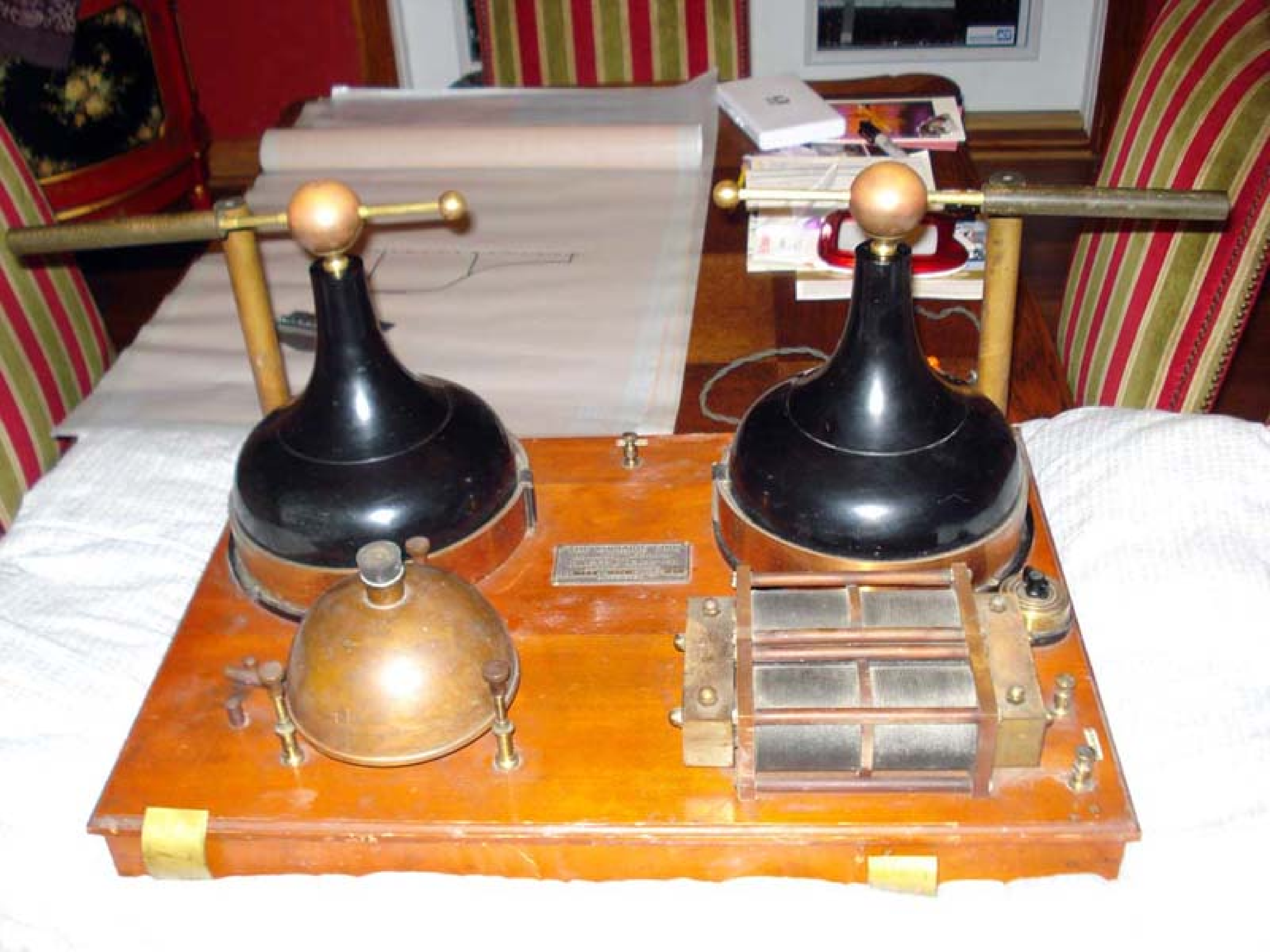


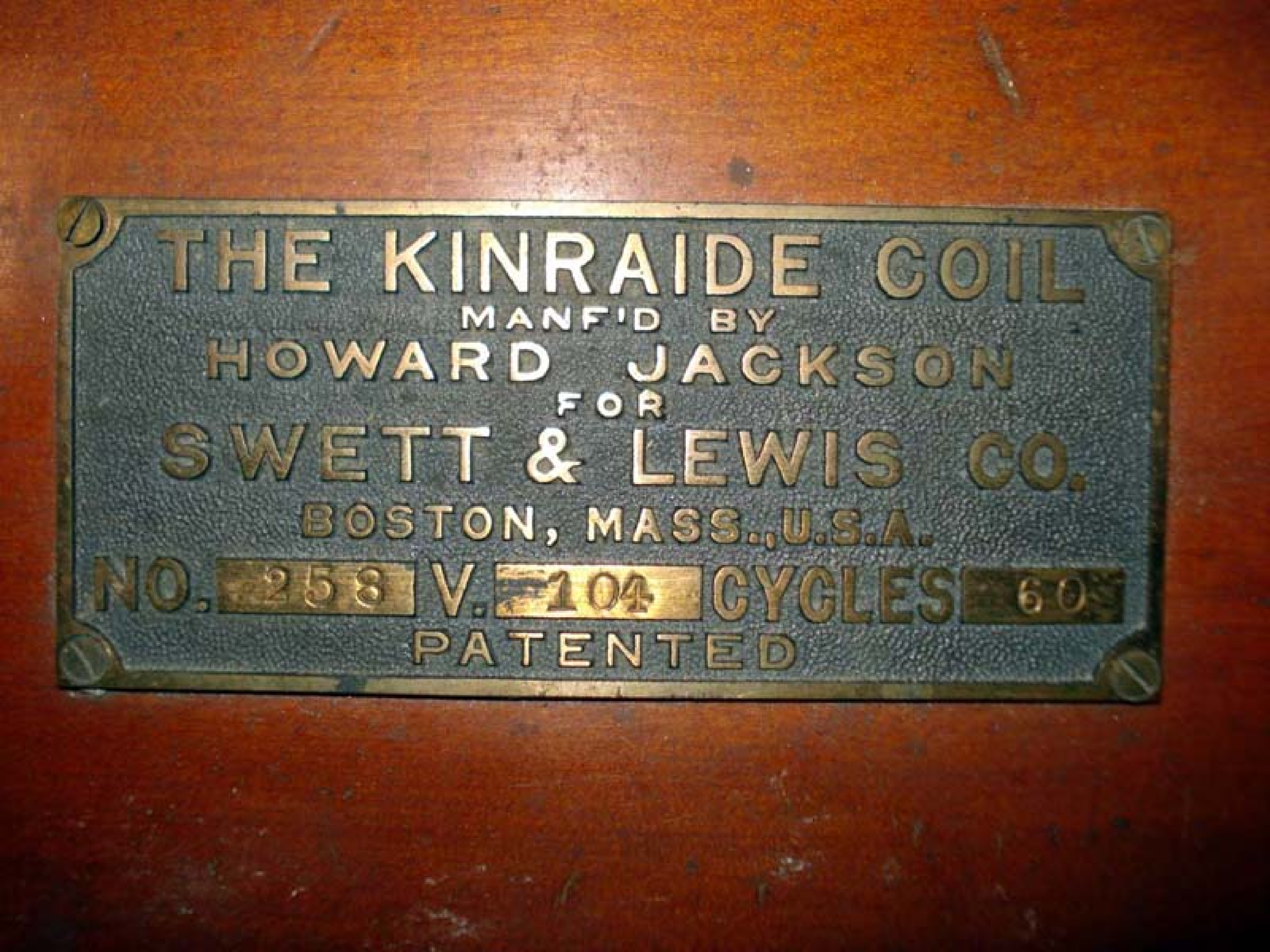












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BOSTON, MASS., U.S.A.
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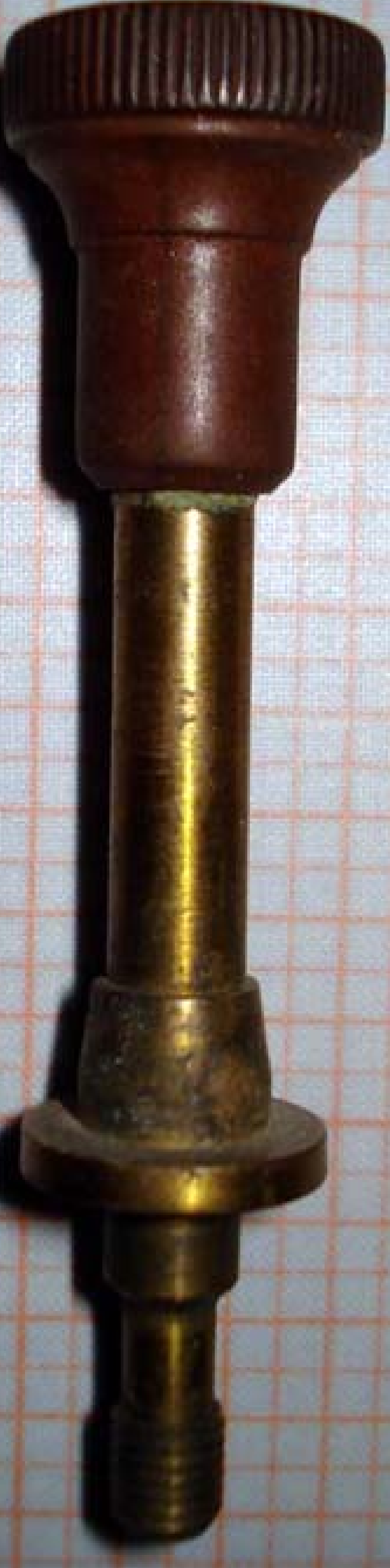
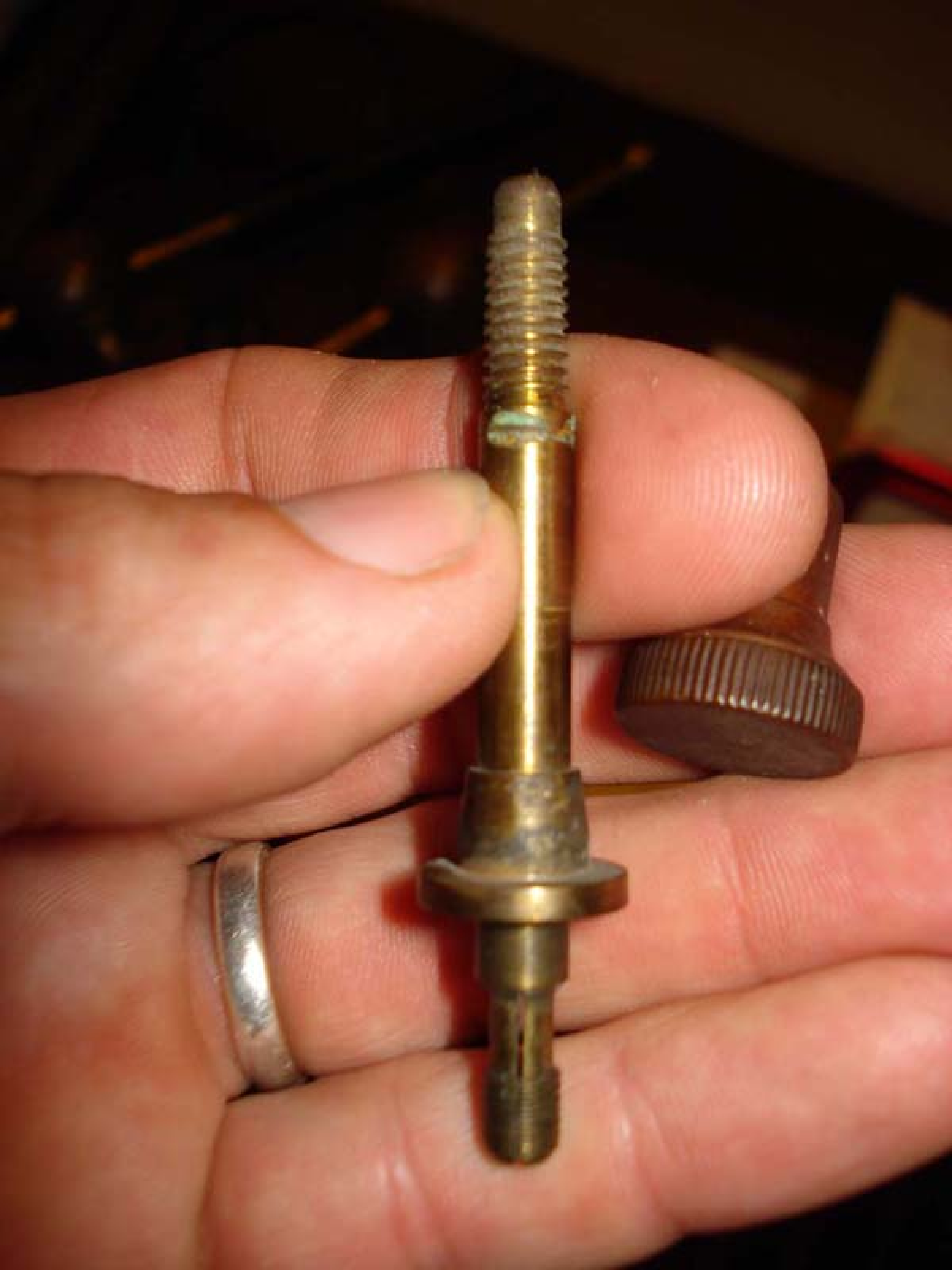
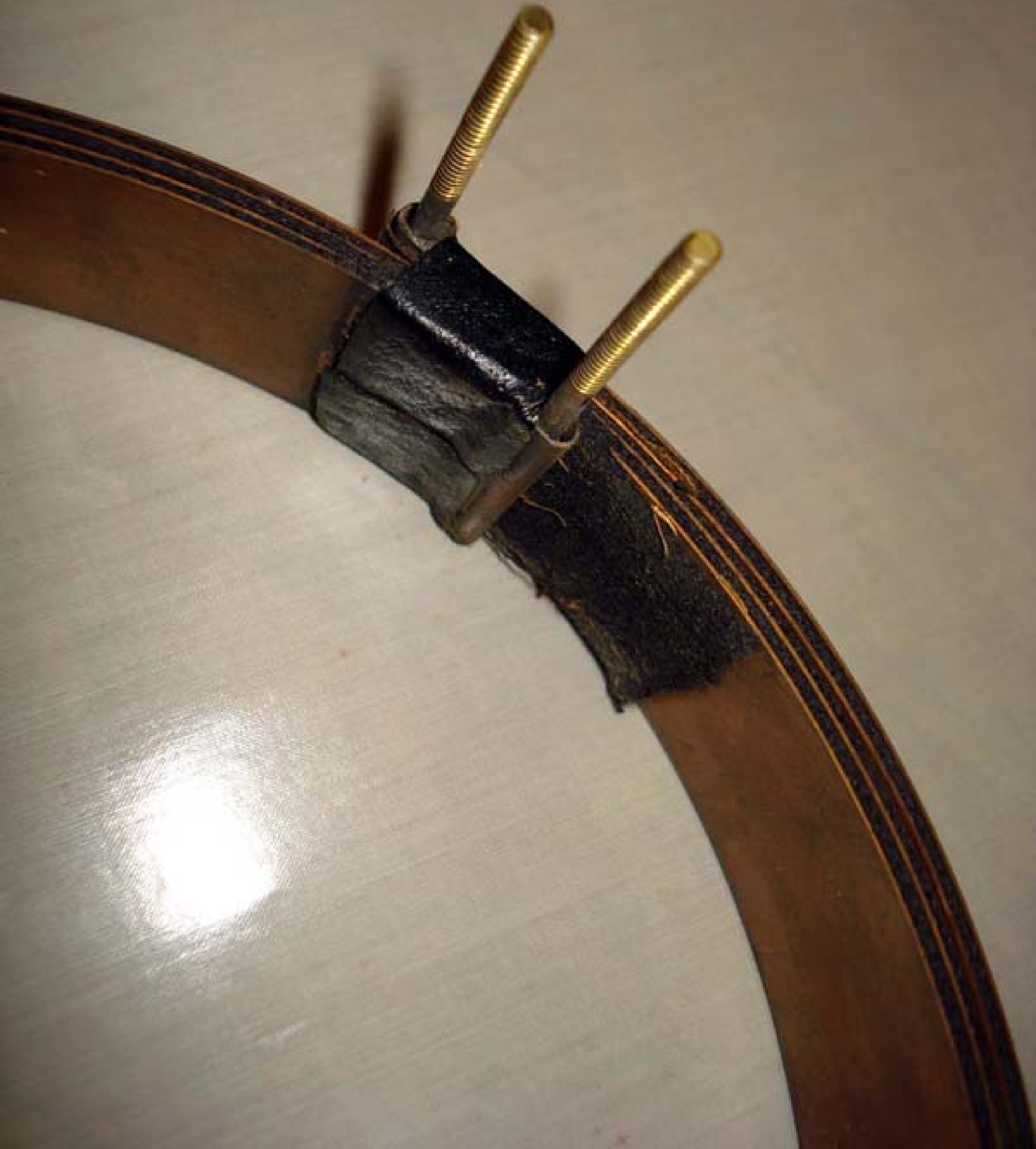
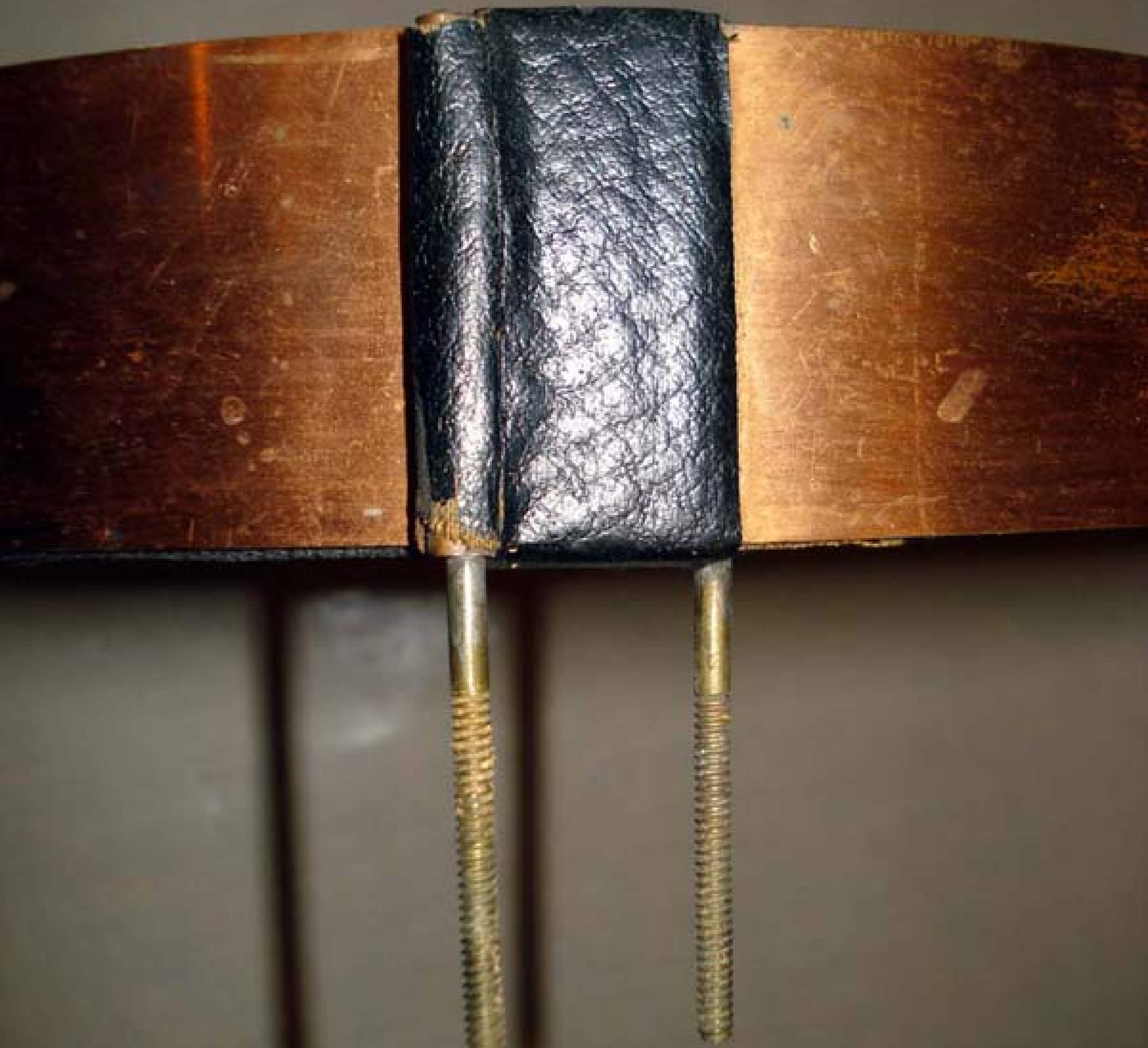
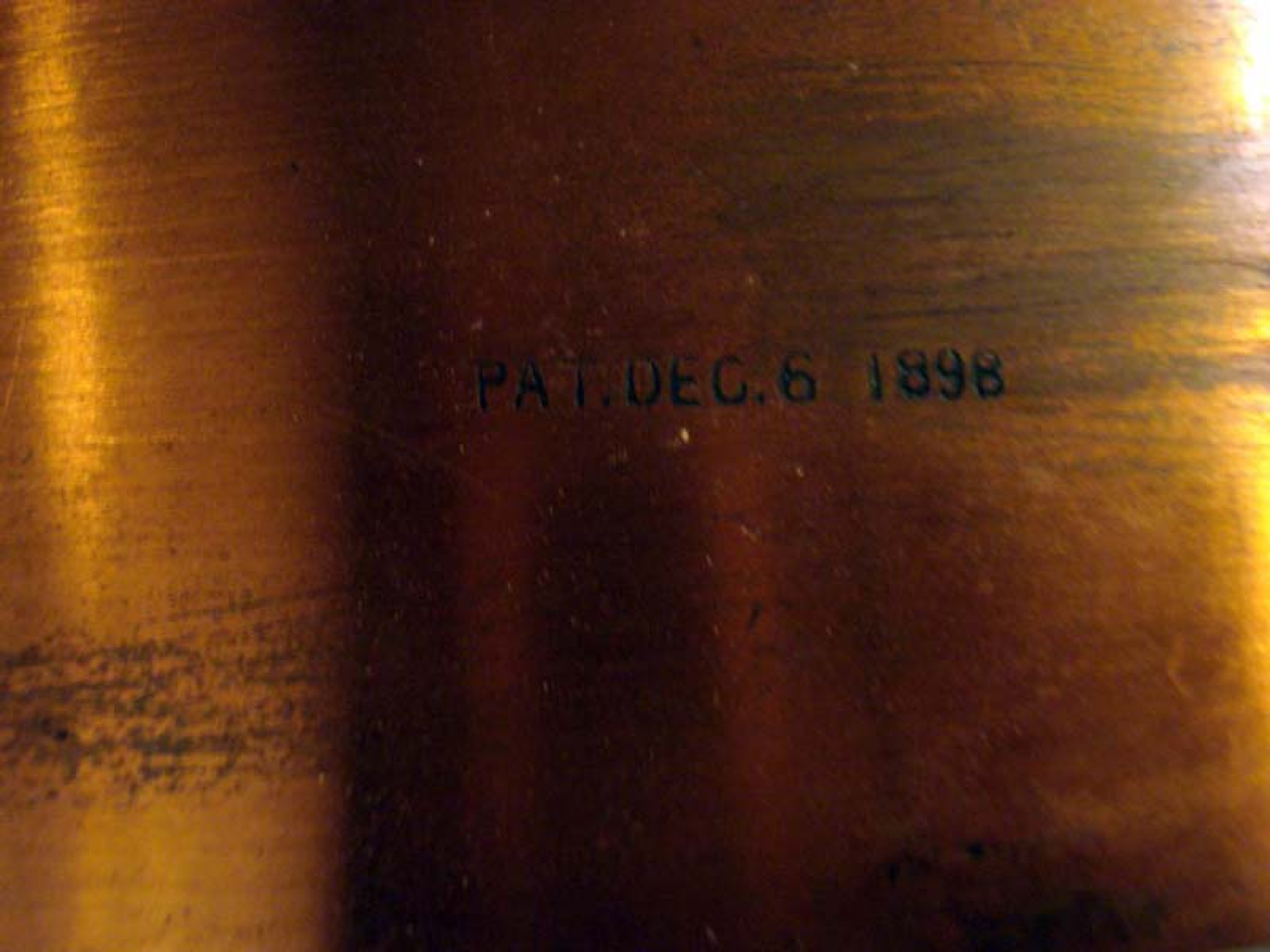
PATENTED







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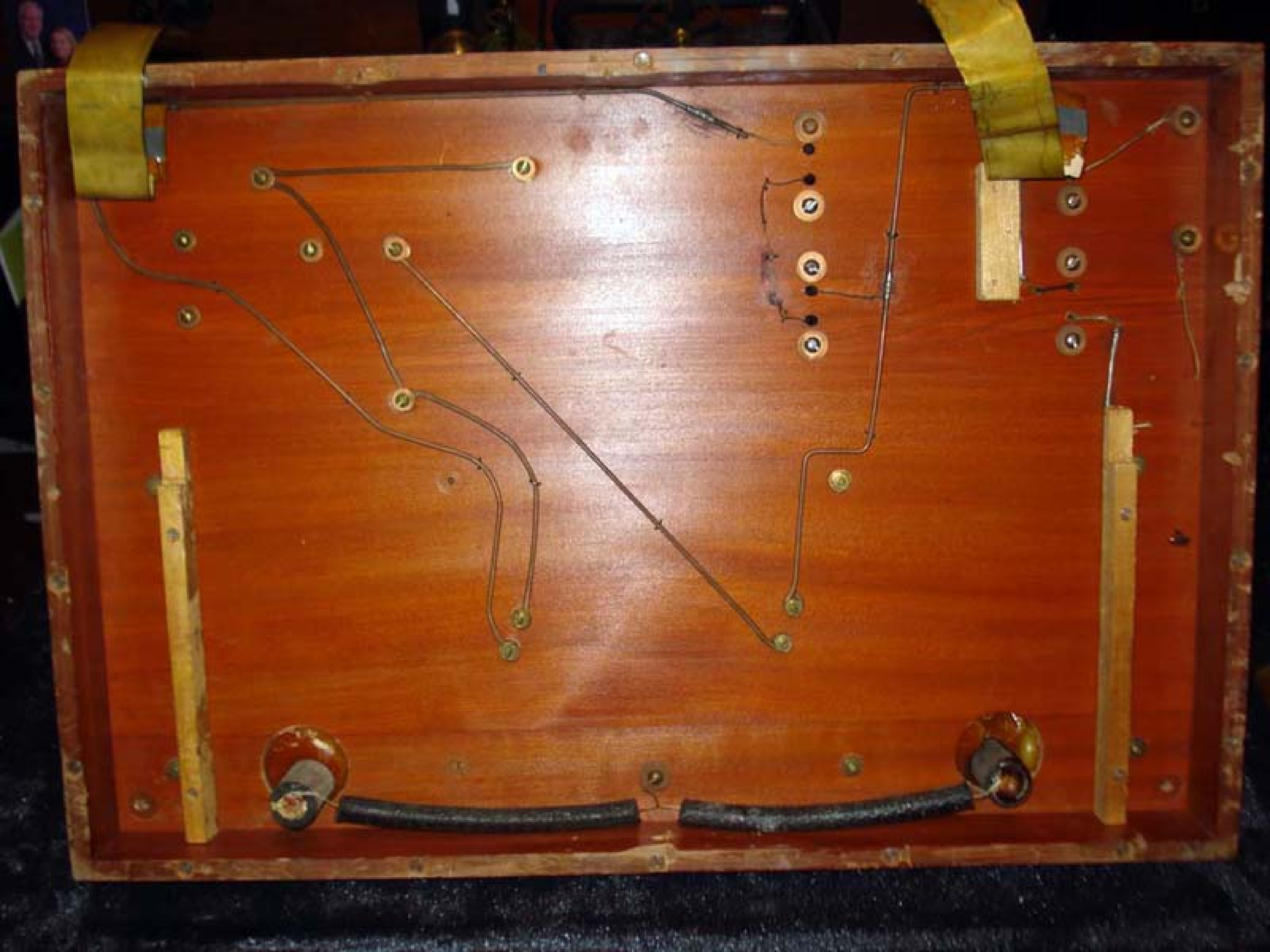
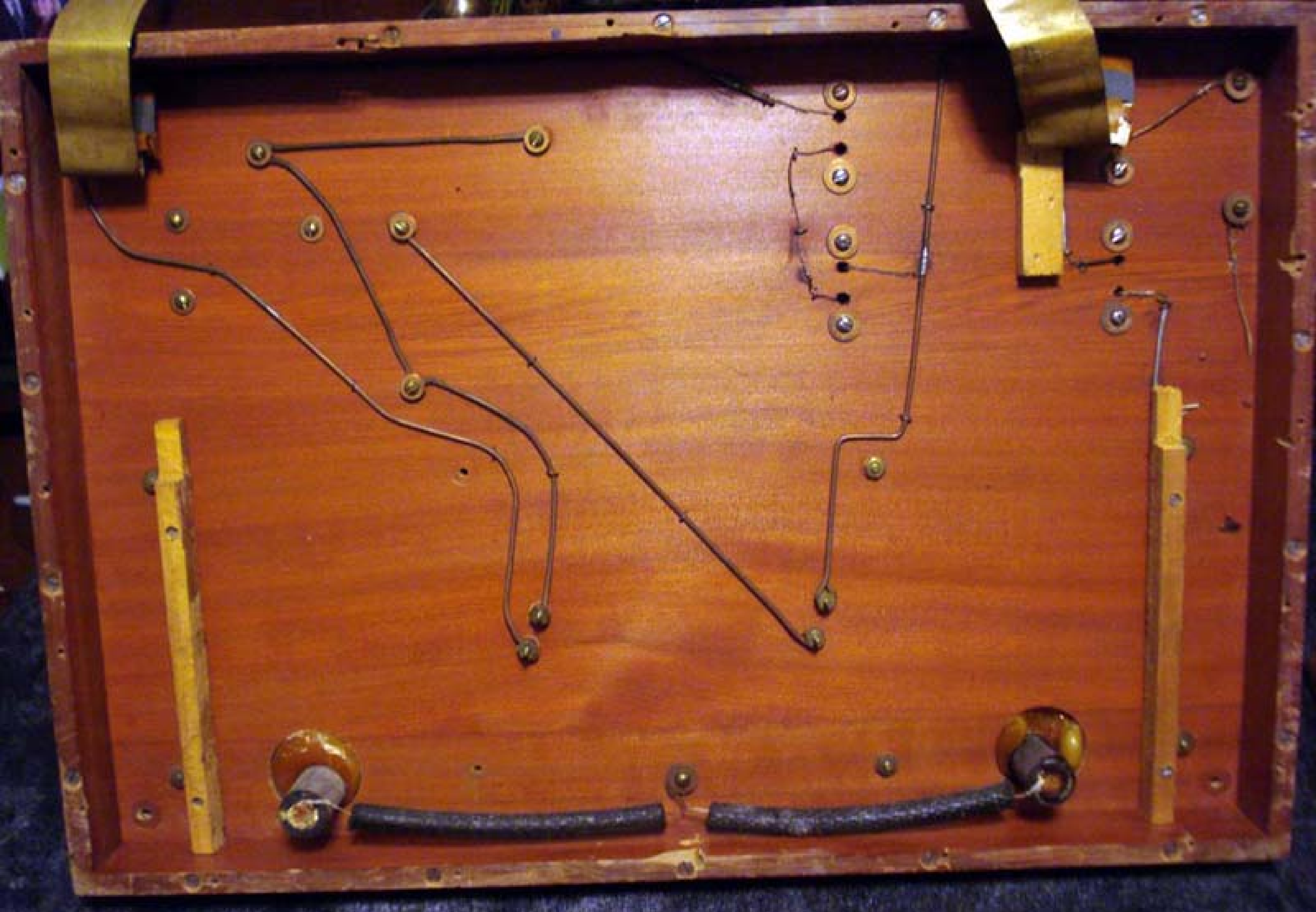
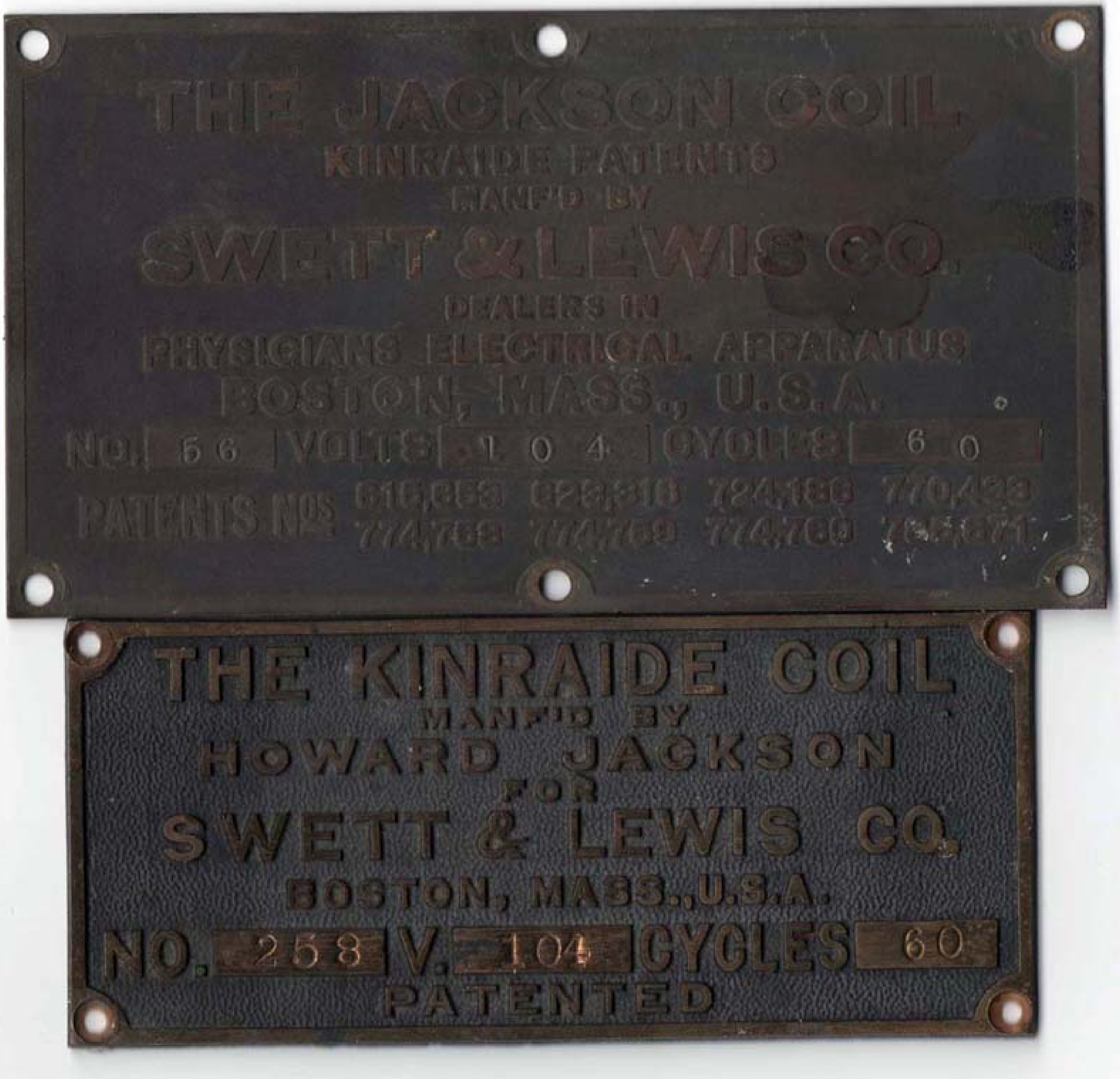




GROUND
THE KINRAIDE
SWETT & LEWIS


THE JACKSON COIL
KINRAIDE PATENTS
MANF'D BY
SWETT & LEWIS CO.
DEALERS IN
PHYSICIANS ELECTRICAL APPARATUS
BOSTON, MASS., U.S.A.
NO. 56 VOLTS 104 CYCLES 60
PATENTS NOS 616,663 628,318 724,186 770,433
774,768 774,769 774,760 785,871
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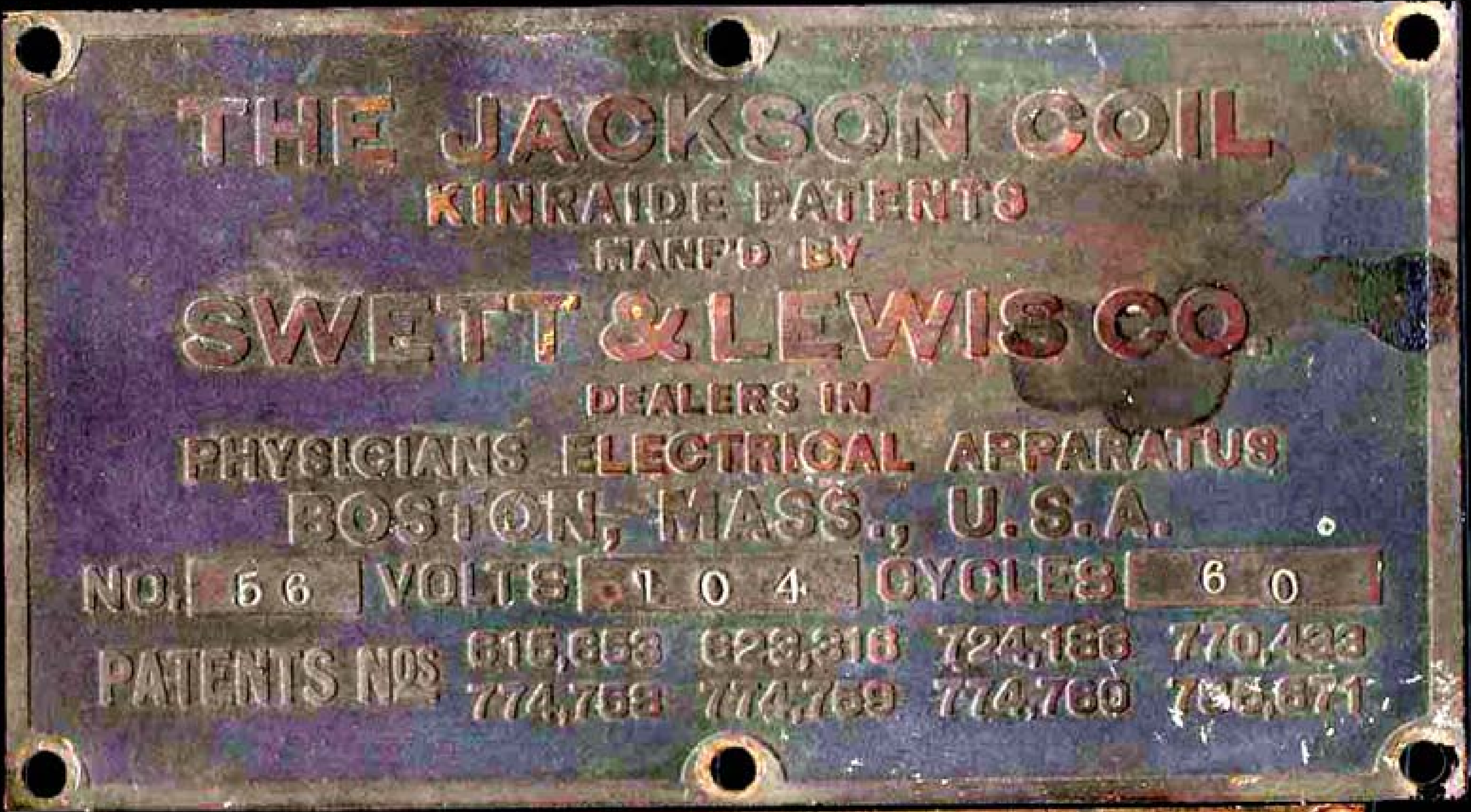

THE JACKSON COIL

KINRAIDE PATENTS

MANF'D BY

SWETT & LEWIS CO.

DEALERS IN

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BOSTON, MASS., U.S.A.

NO. 56 VOLTS 104 CYCLES 60

PATENTS NOS 616,653 628,318 724,186 770,433
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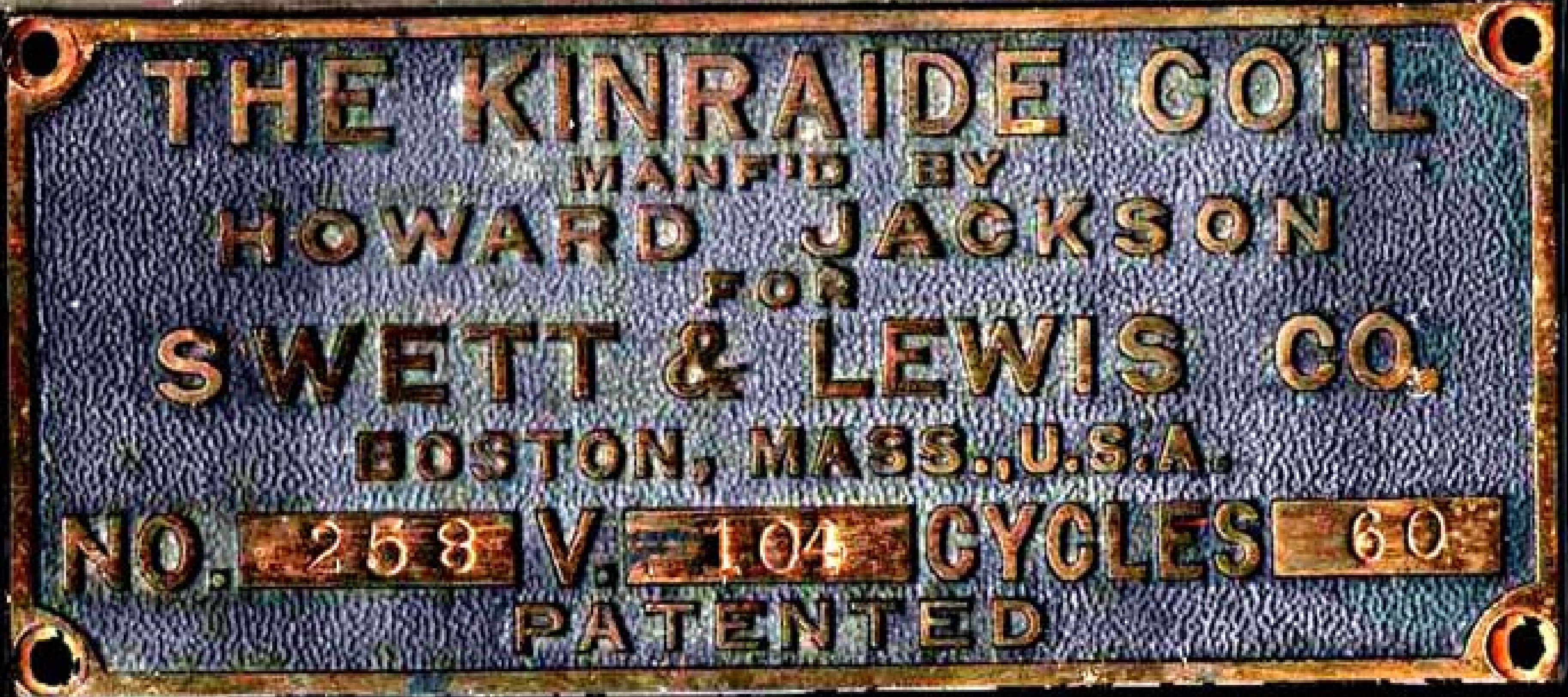

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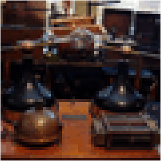

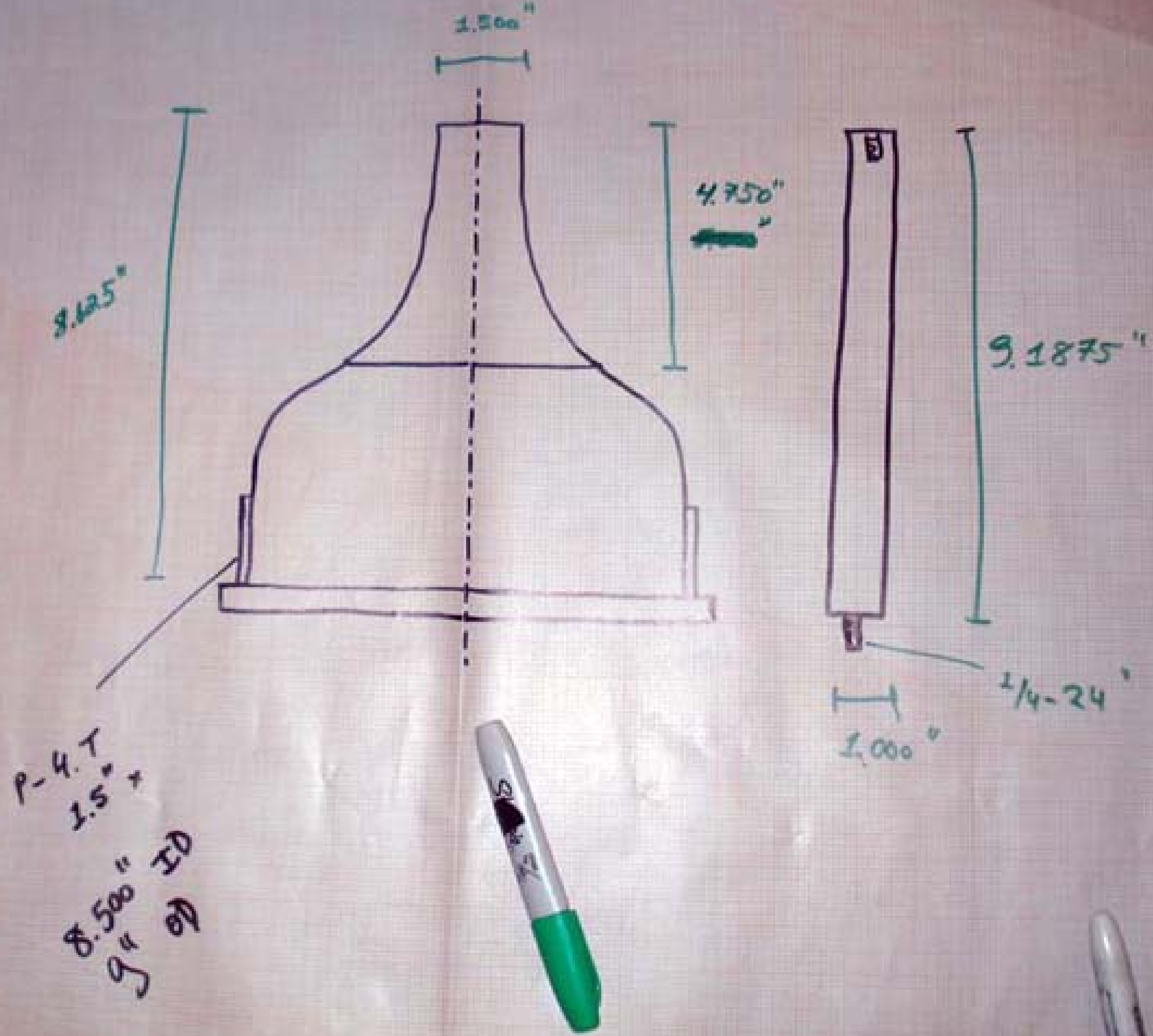
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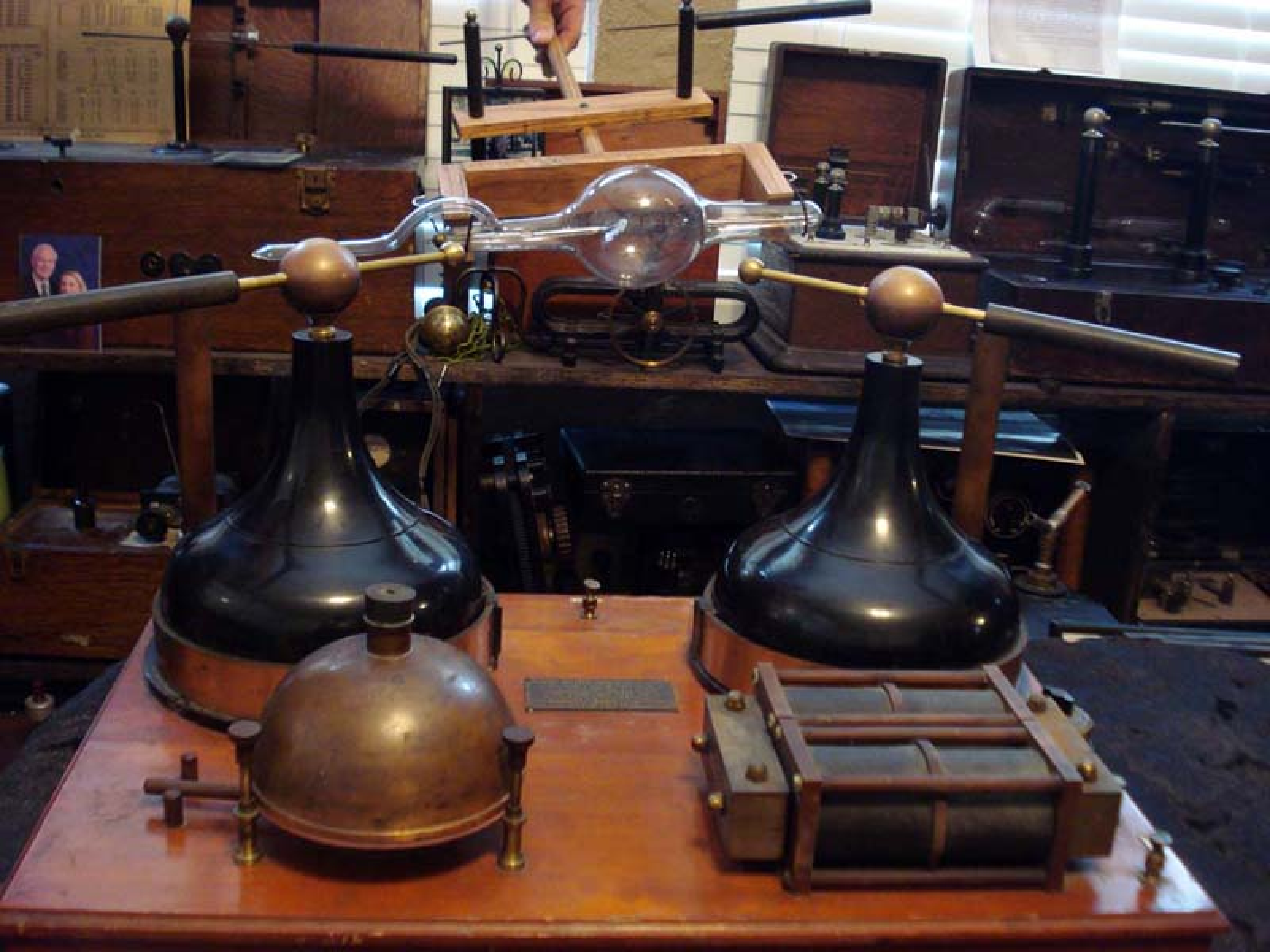

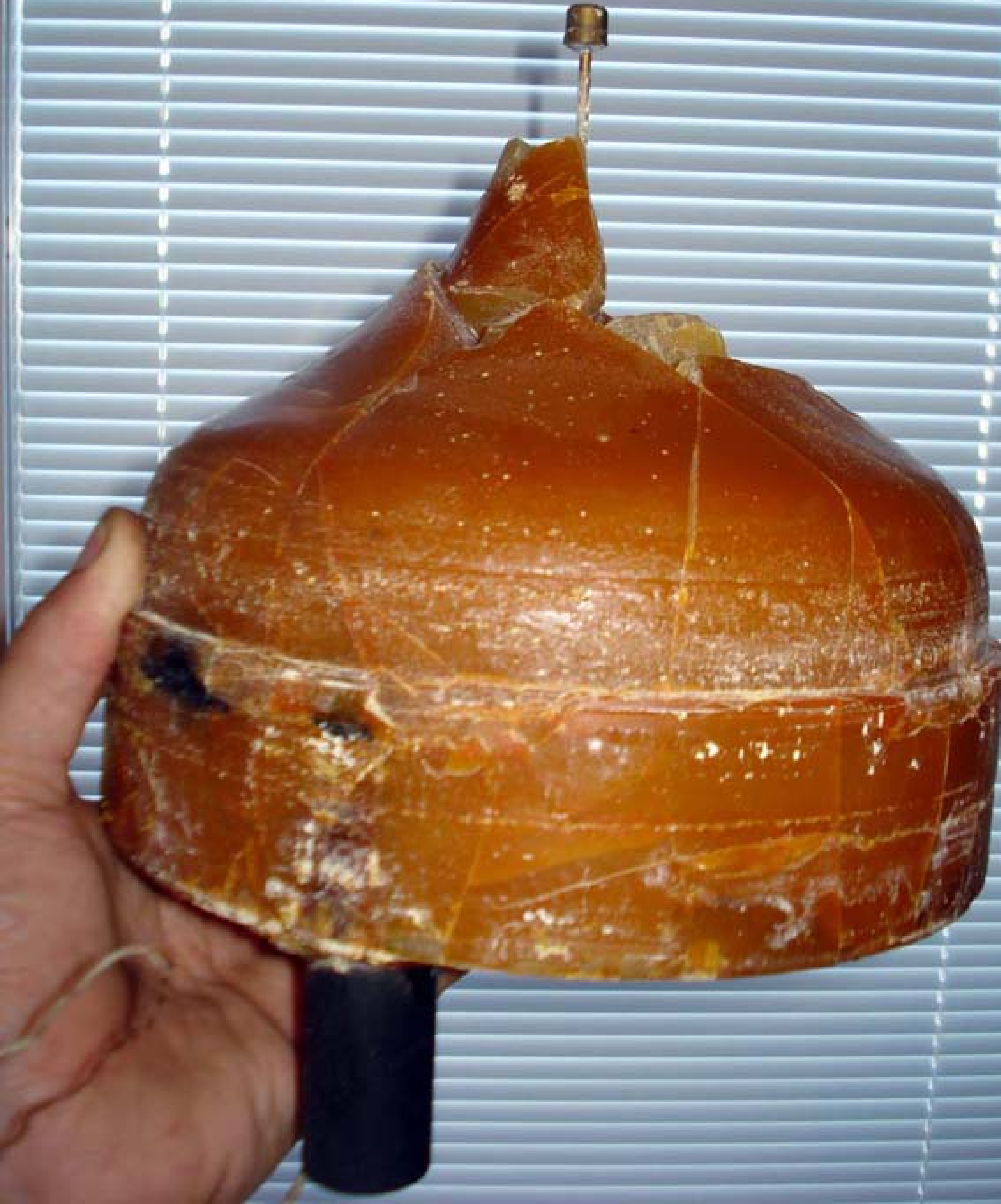

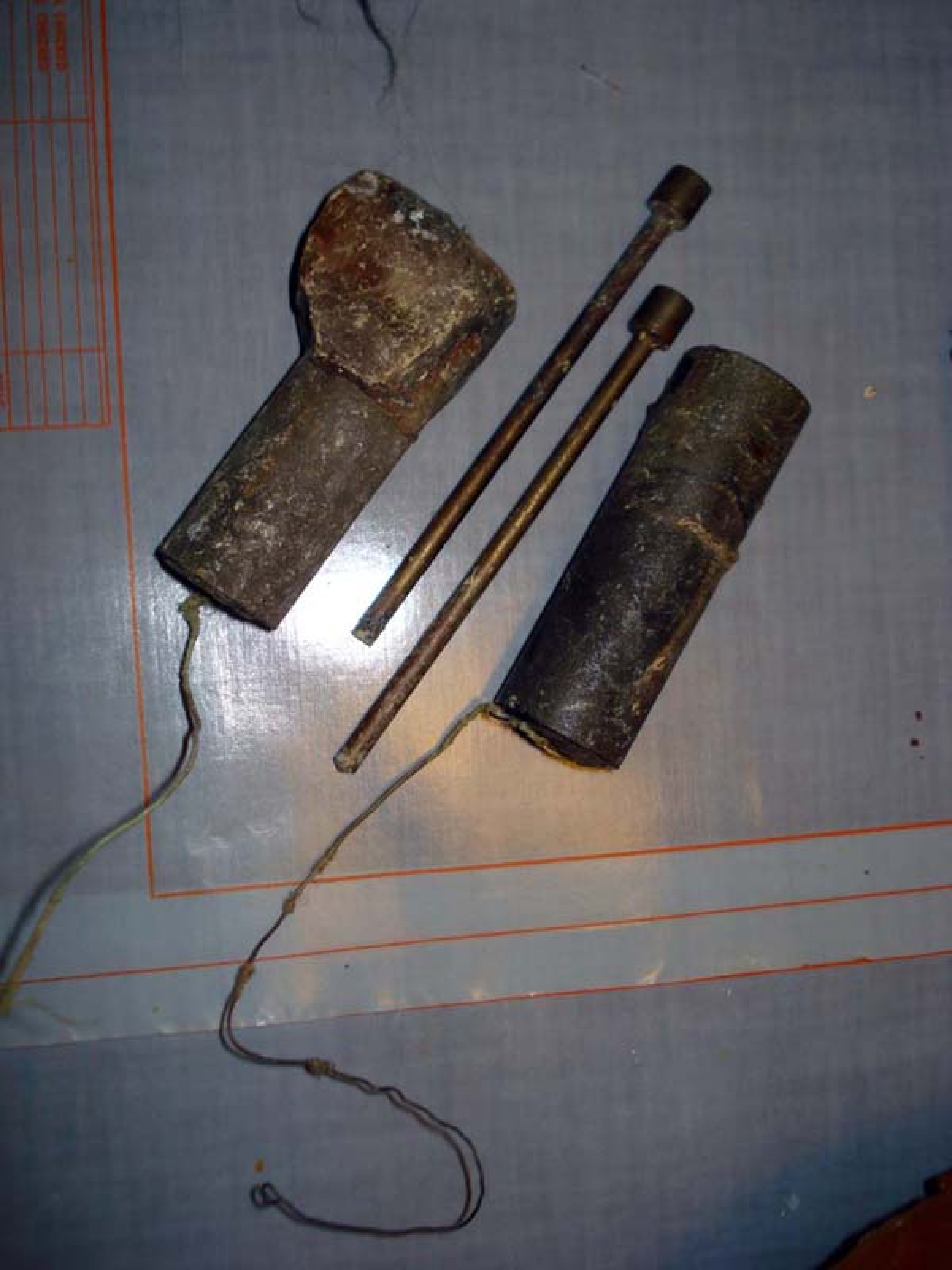

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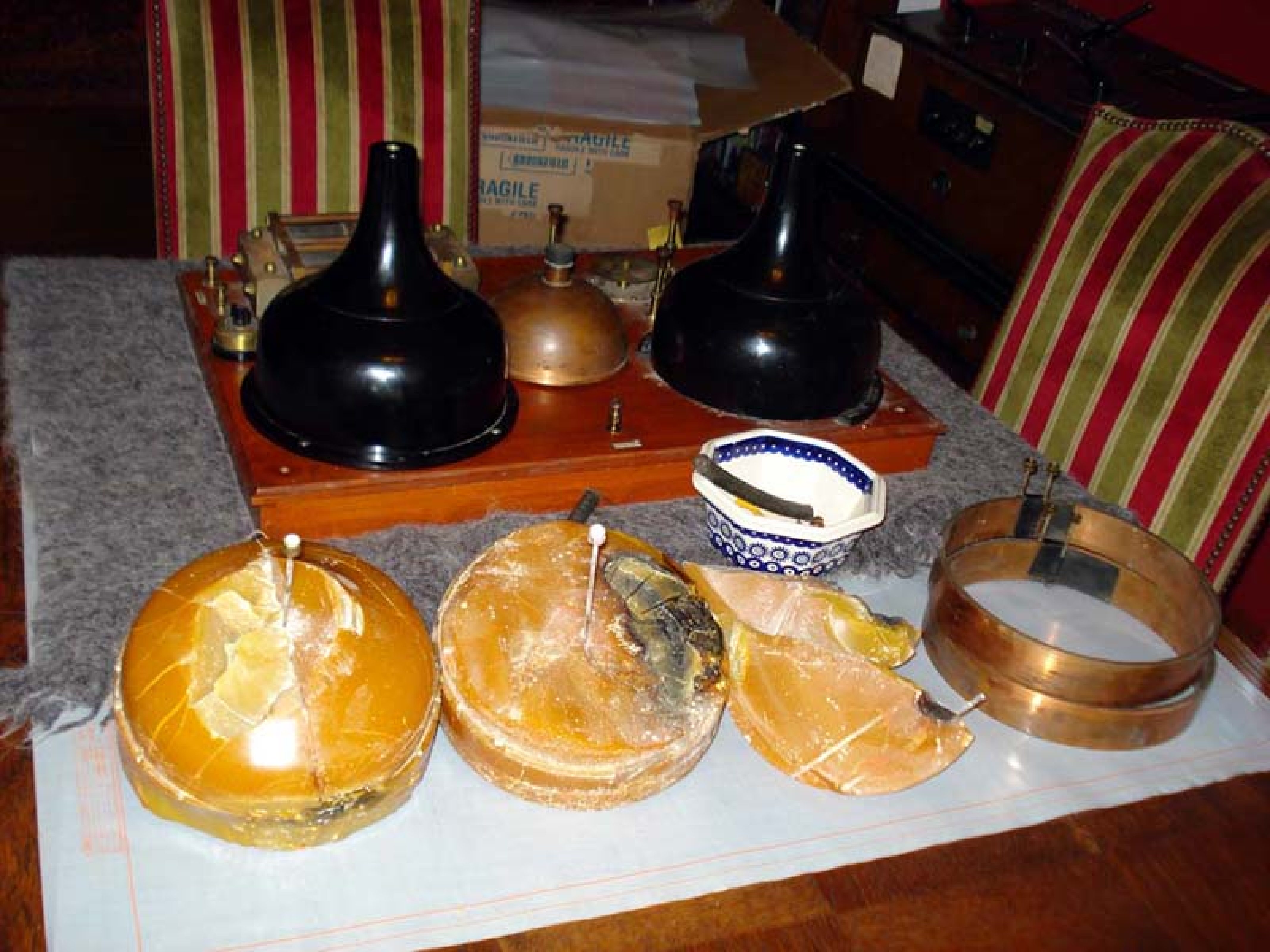
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RAGILE

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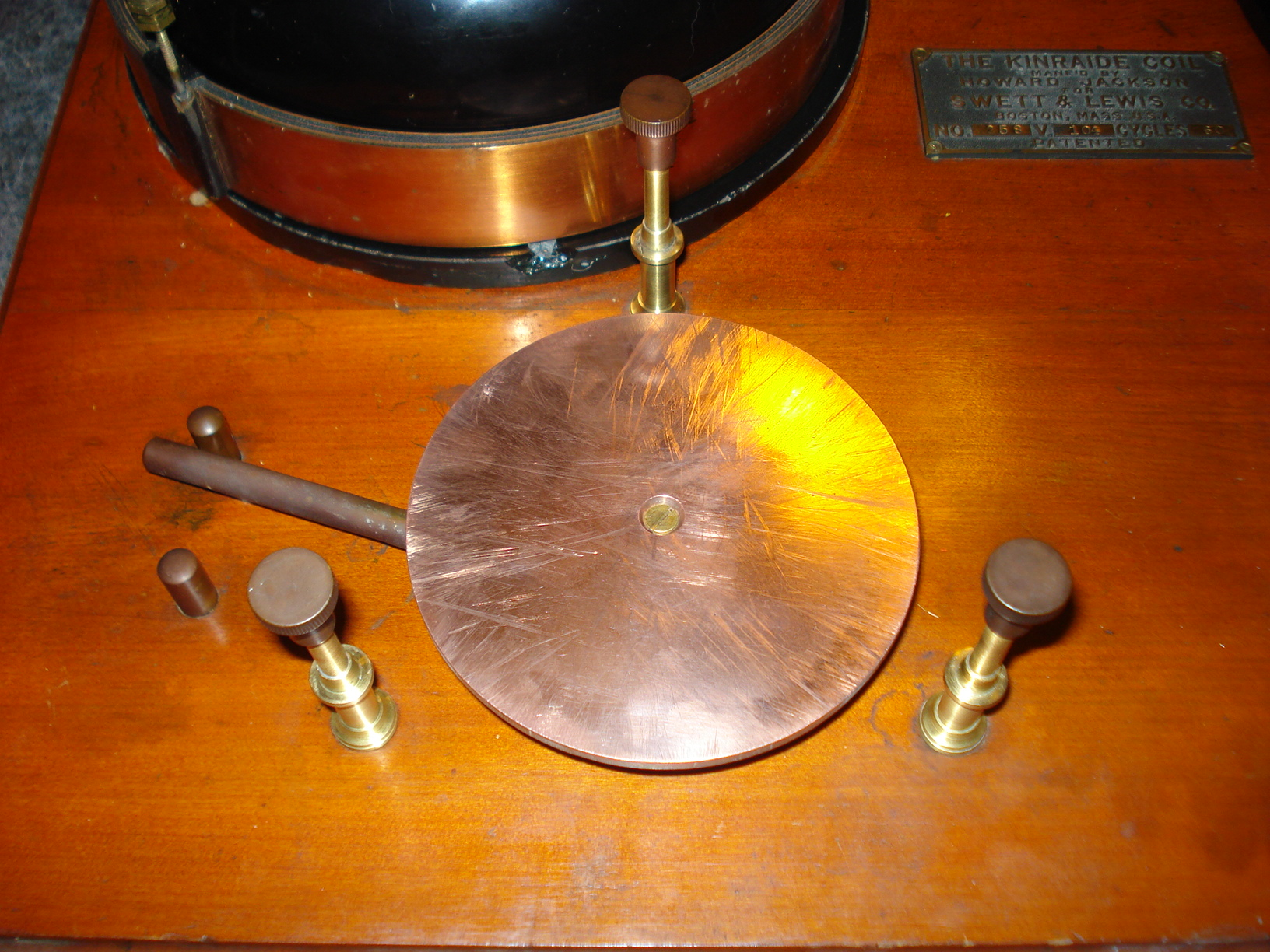
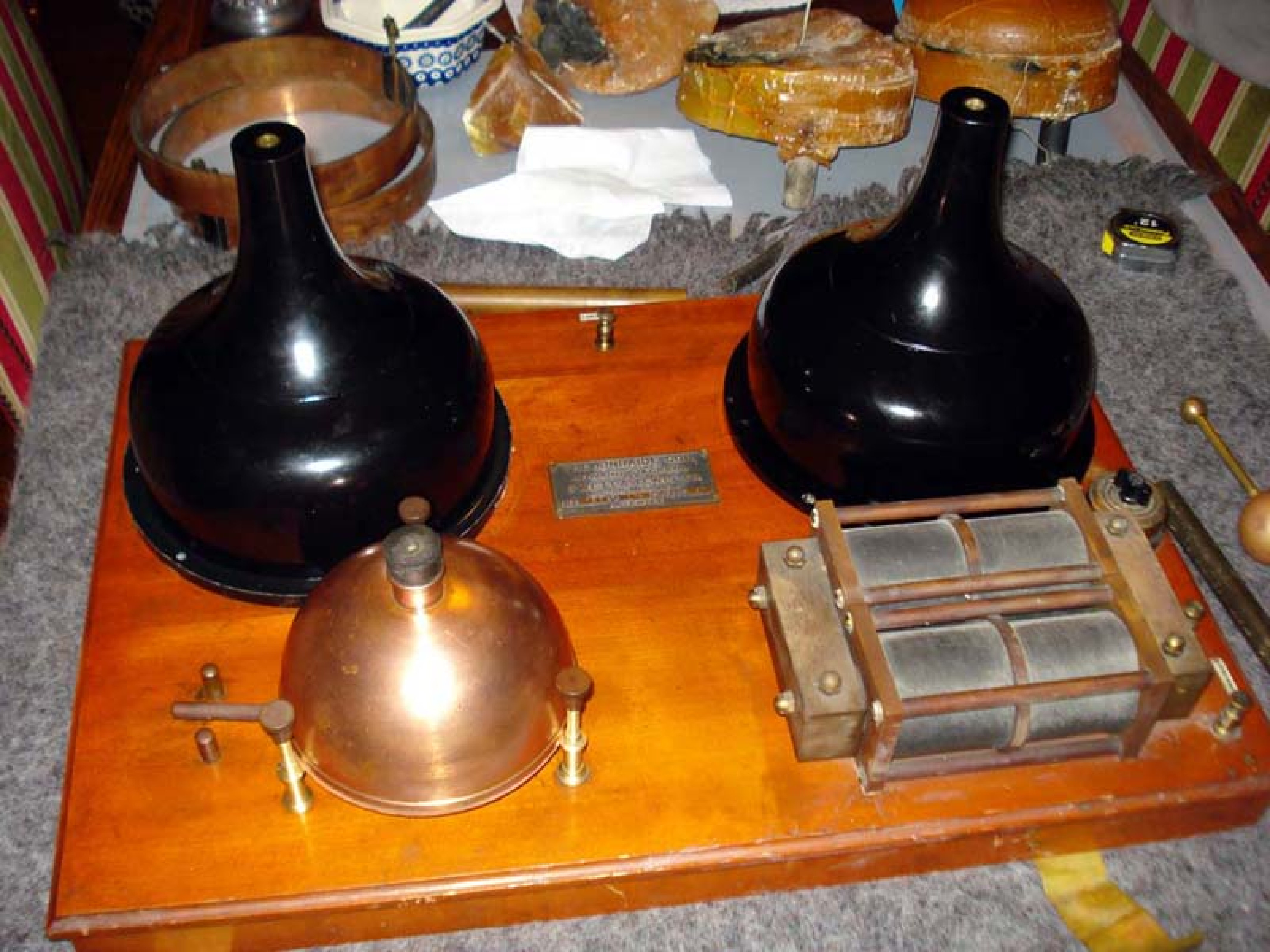
TAYLOR

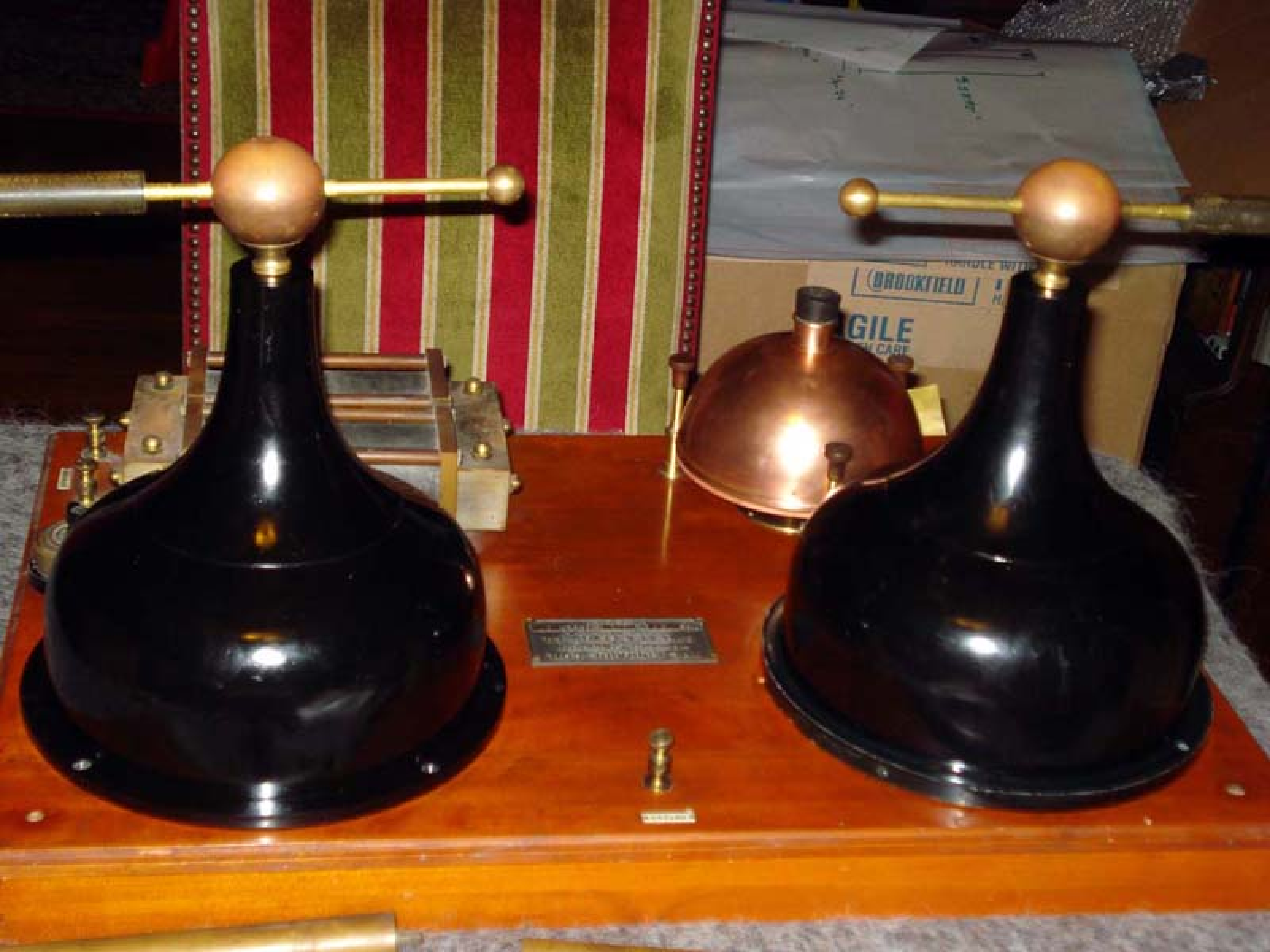
NAPA
USA


THE KINRAIDE COIL
MANF'D BY
HOWARD JACKSON
FOR
SWETT & LEWIS CO.
BOSTON, MASS. U.S.A.
NO. 258 V. 104 CYCLES 60
PATENTED

HOSKINS
ELECTRIC FURNACE
HOSKINS MFG. CO
E.T.
E.T.

HOSKINS
ELECTRIC FURNACE
E.T.

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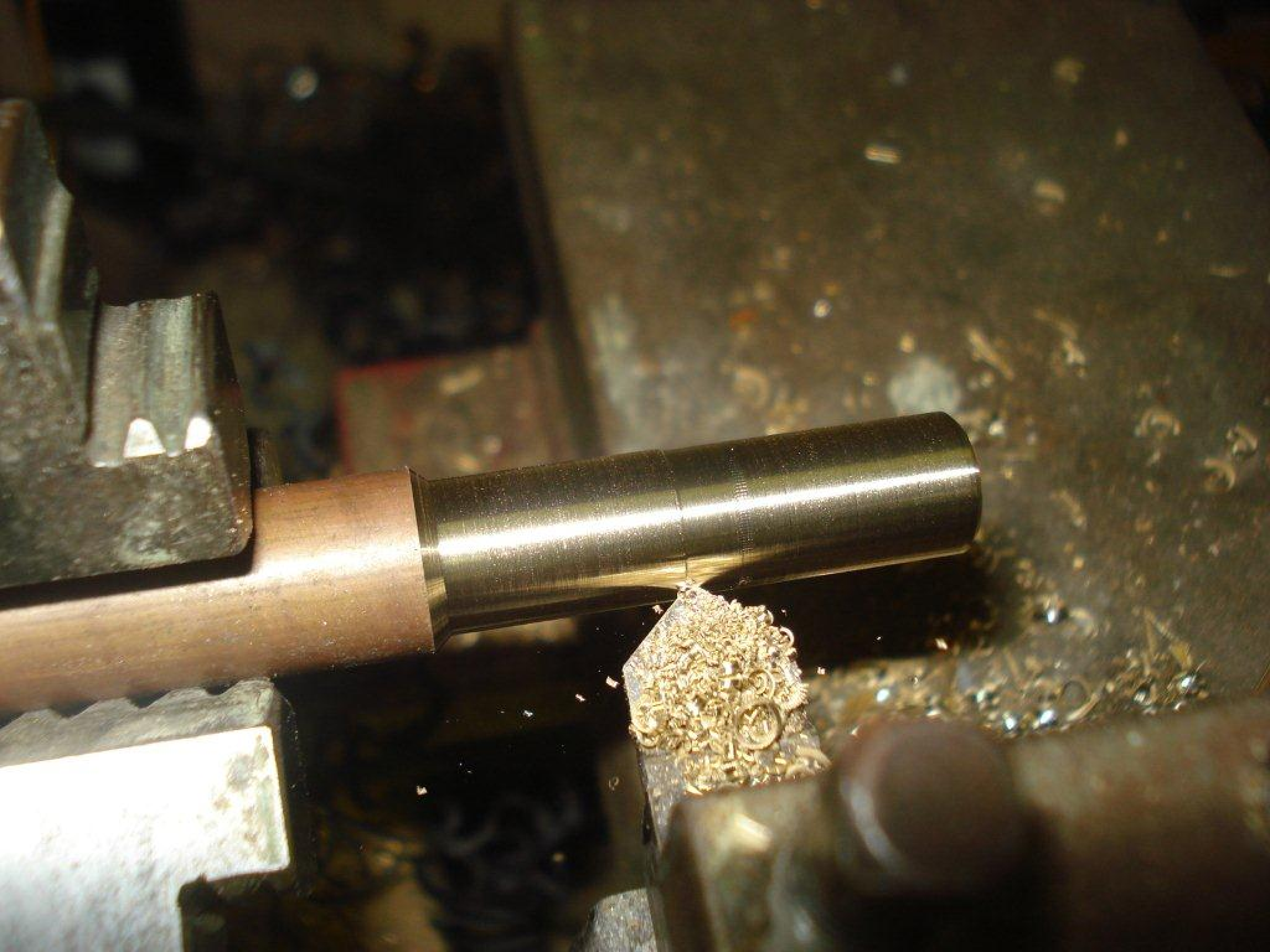
PRIORITY MAIL
UNITED STATES POSTAL SERVICE



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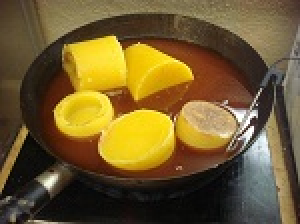

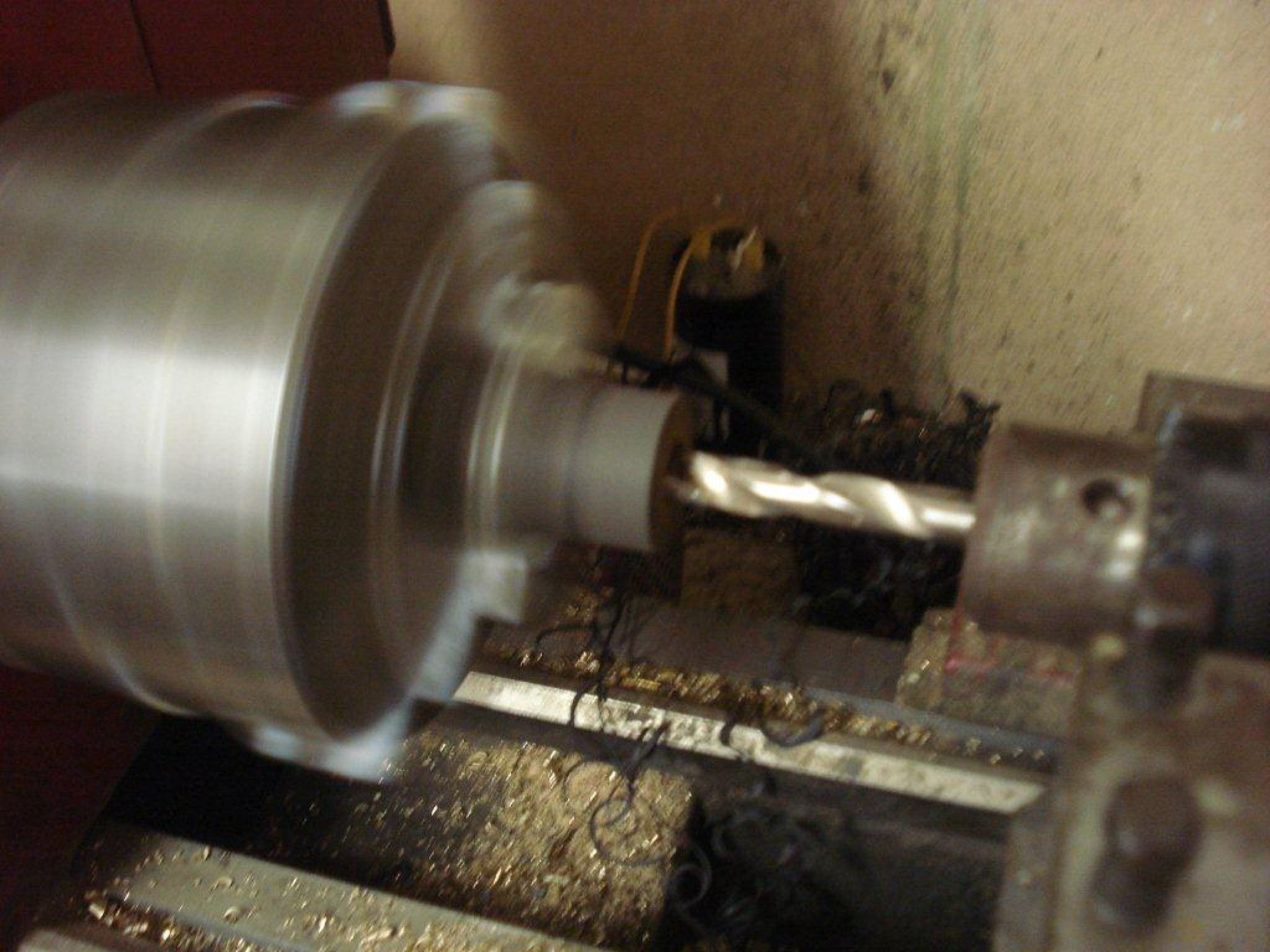

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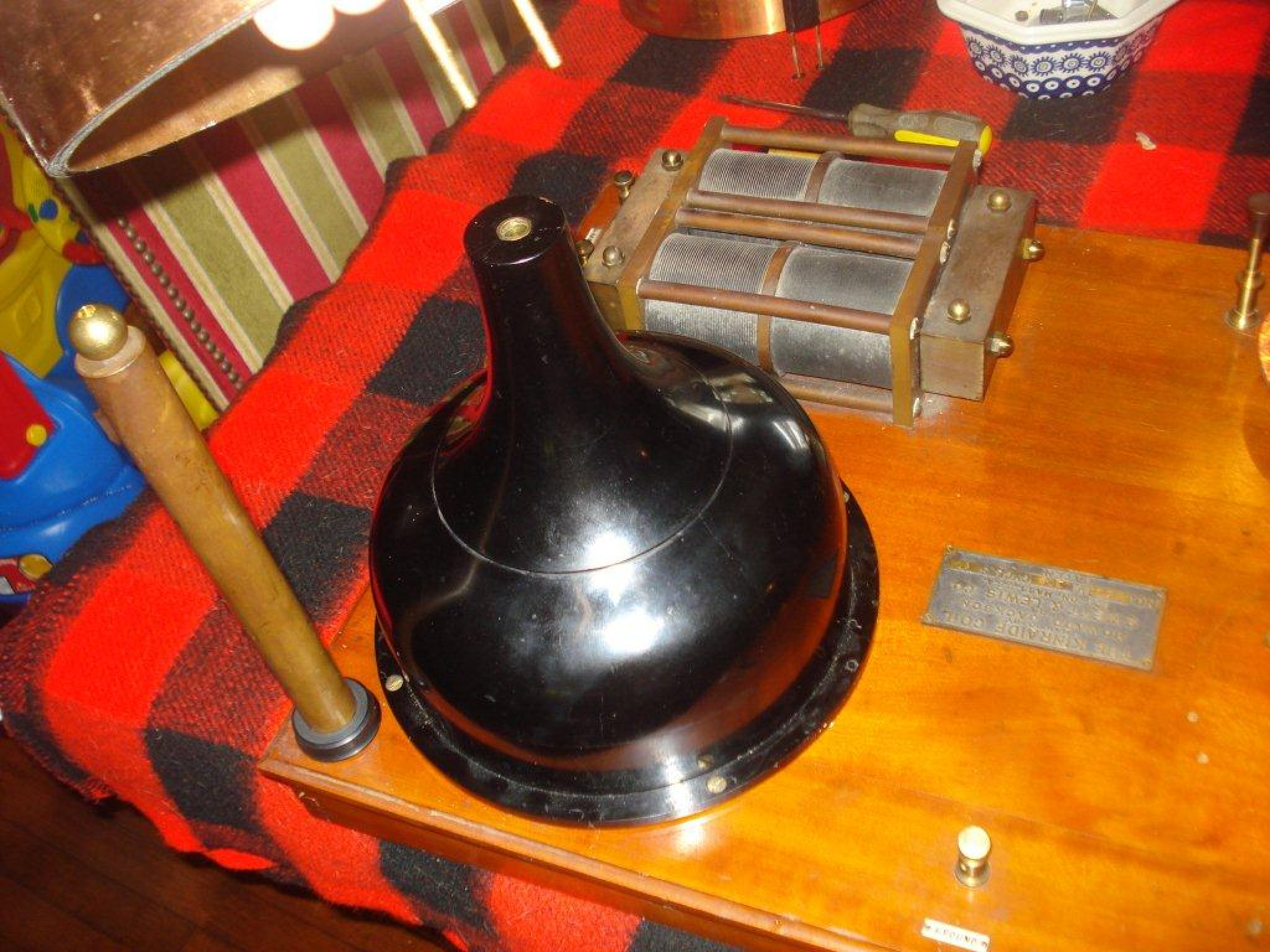
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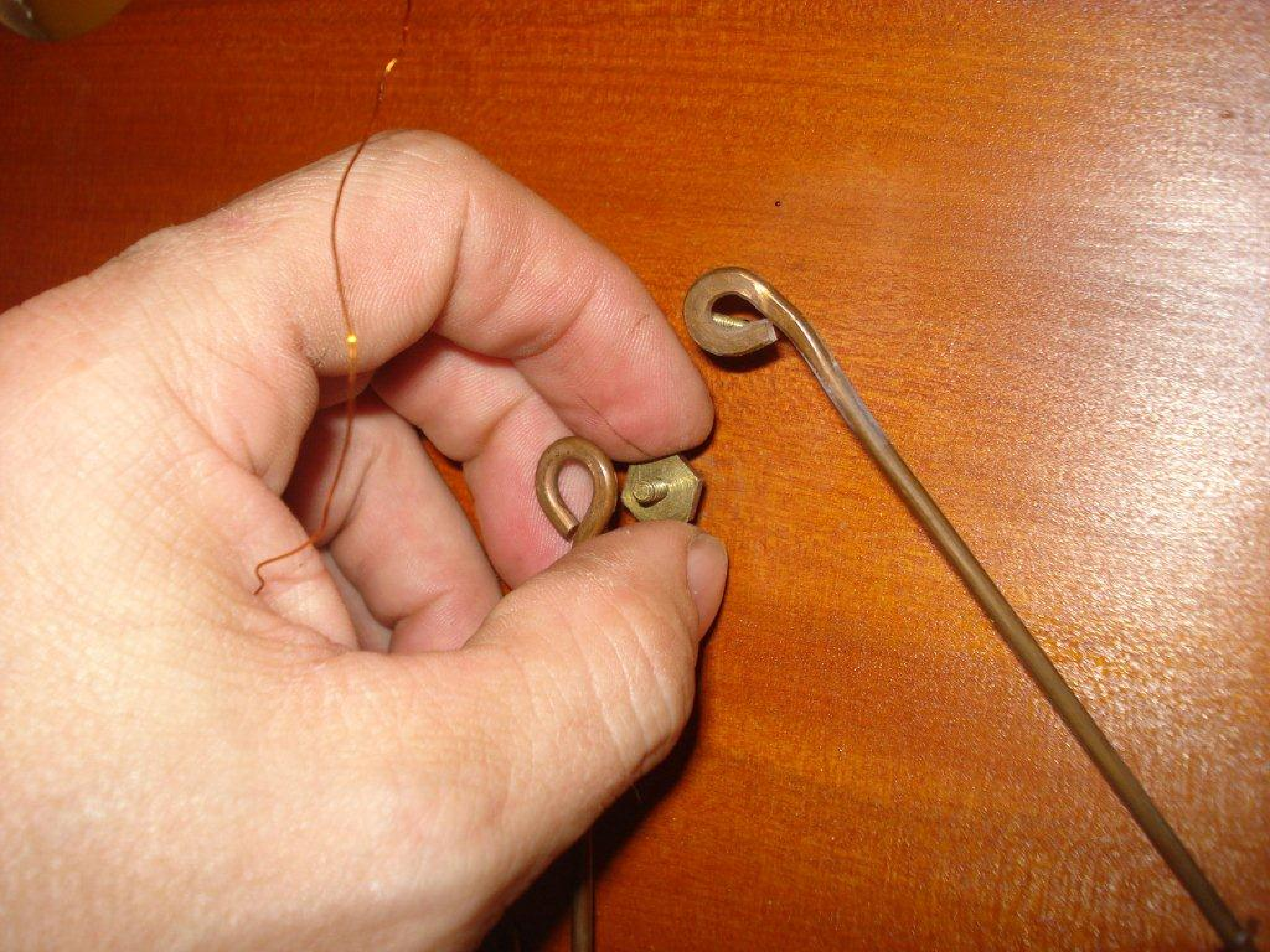
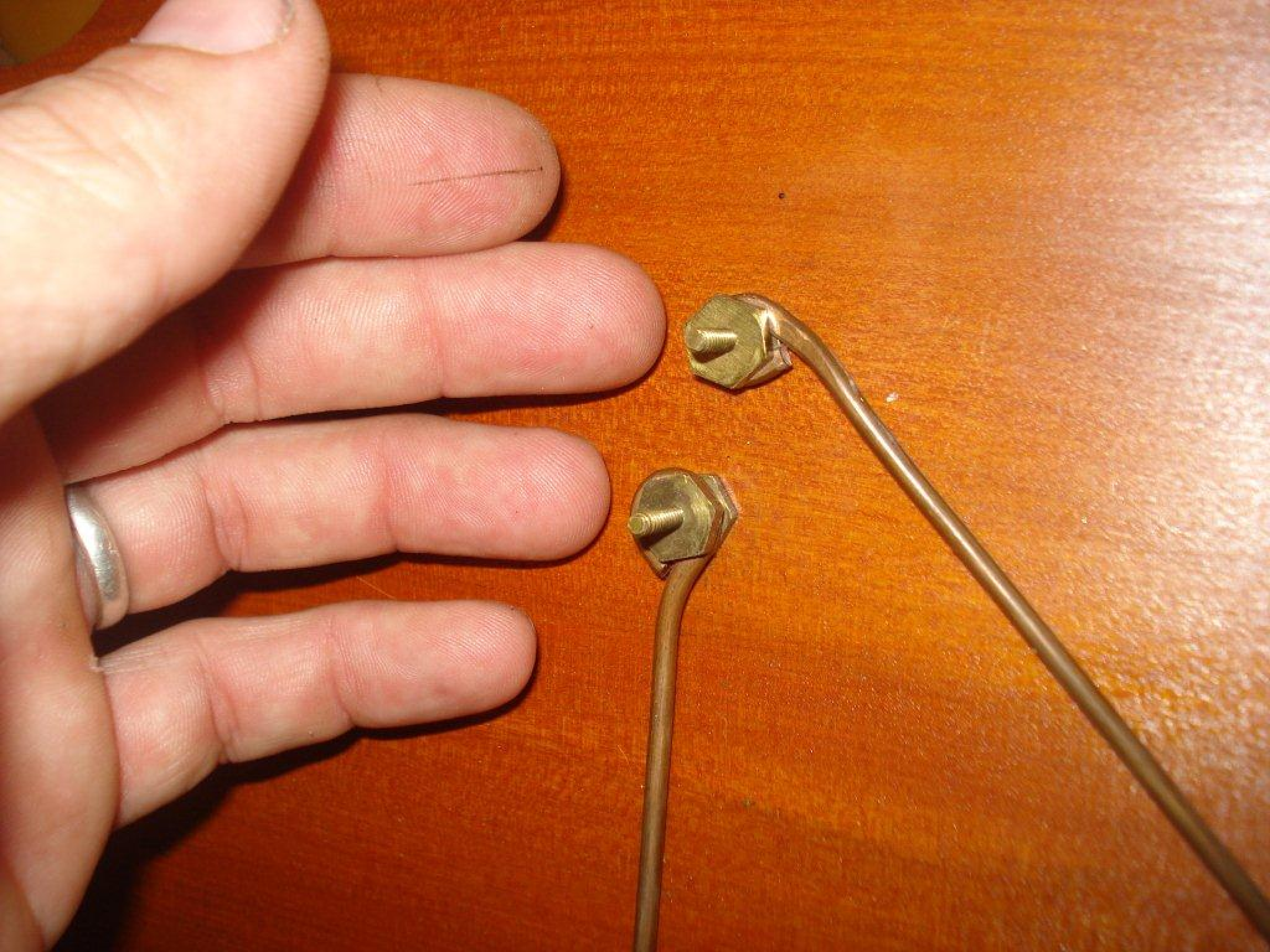
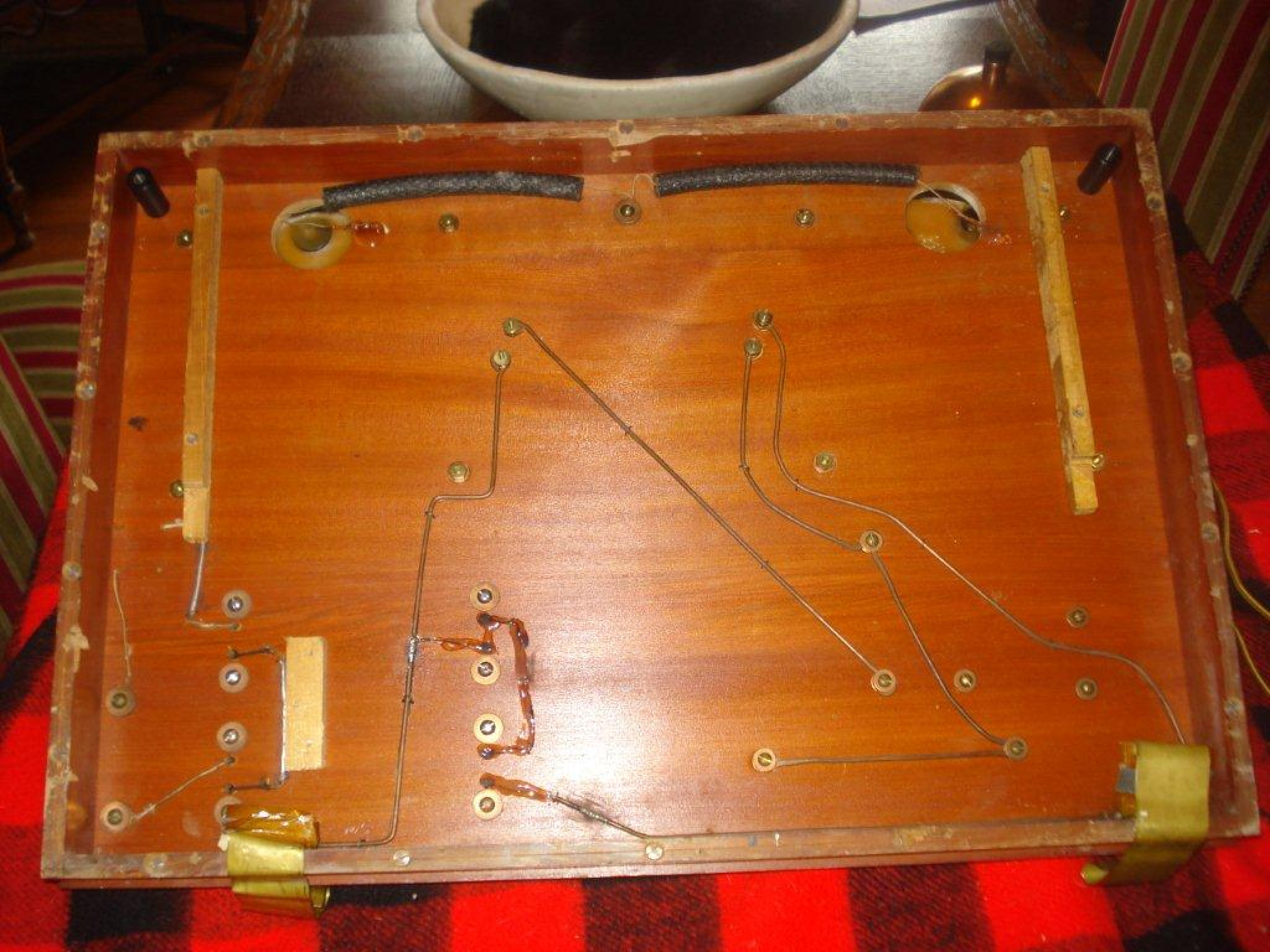
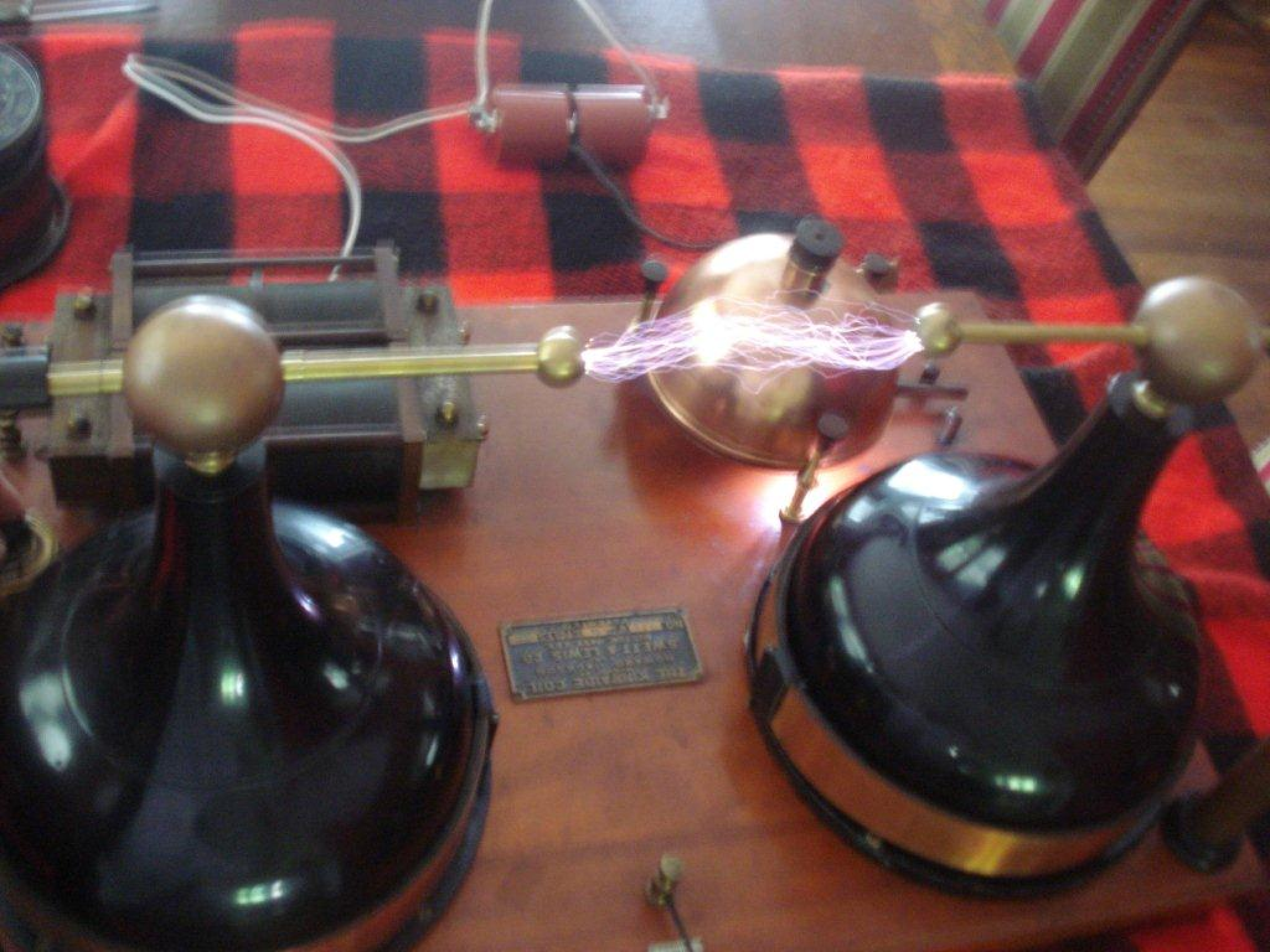
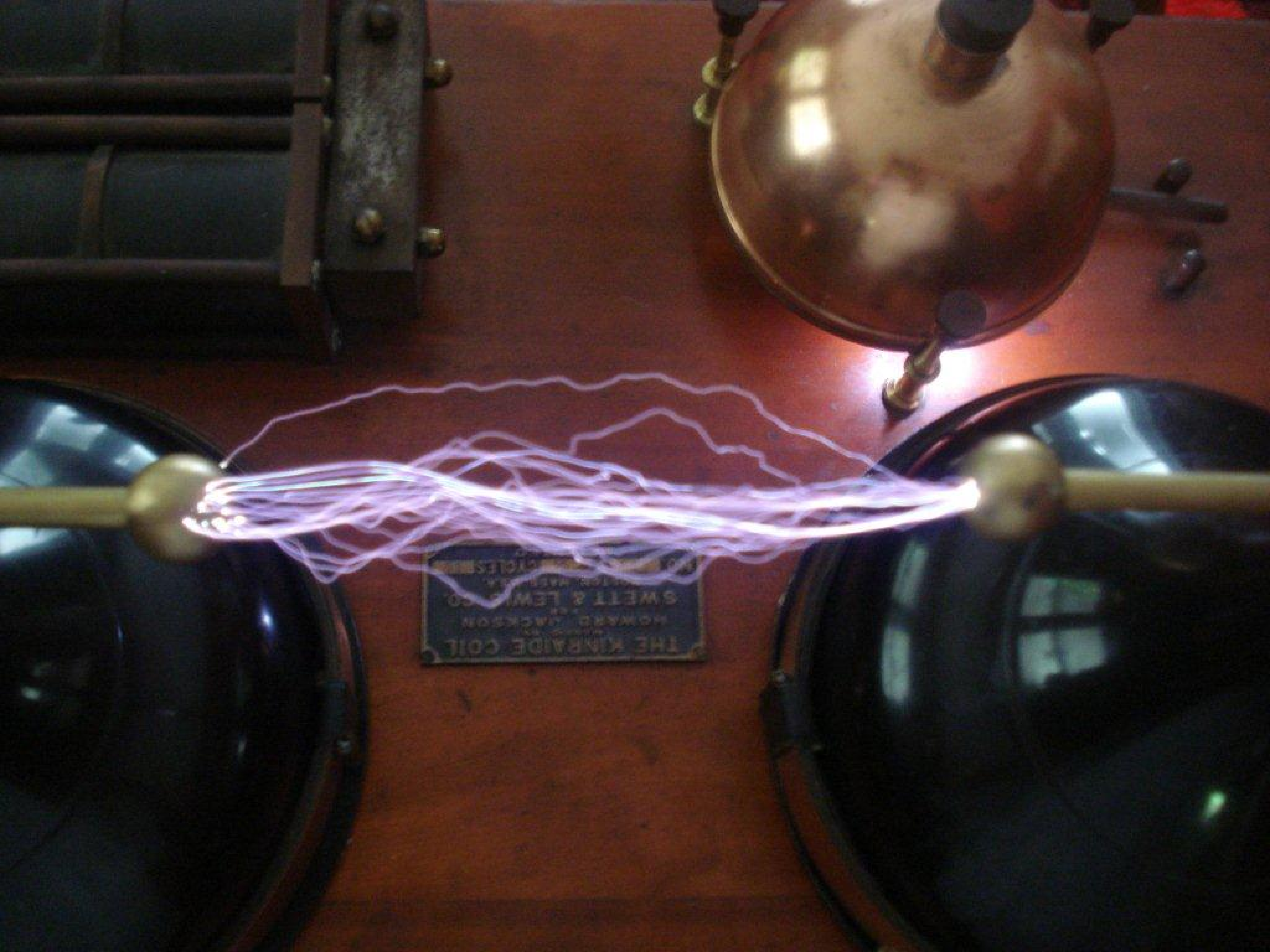
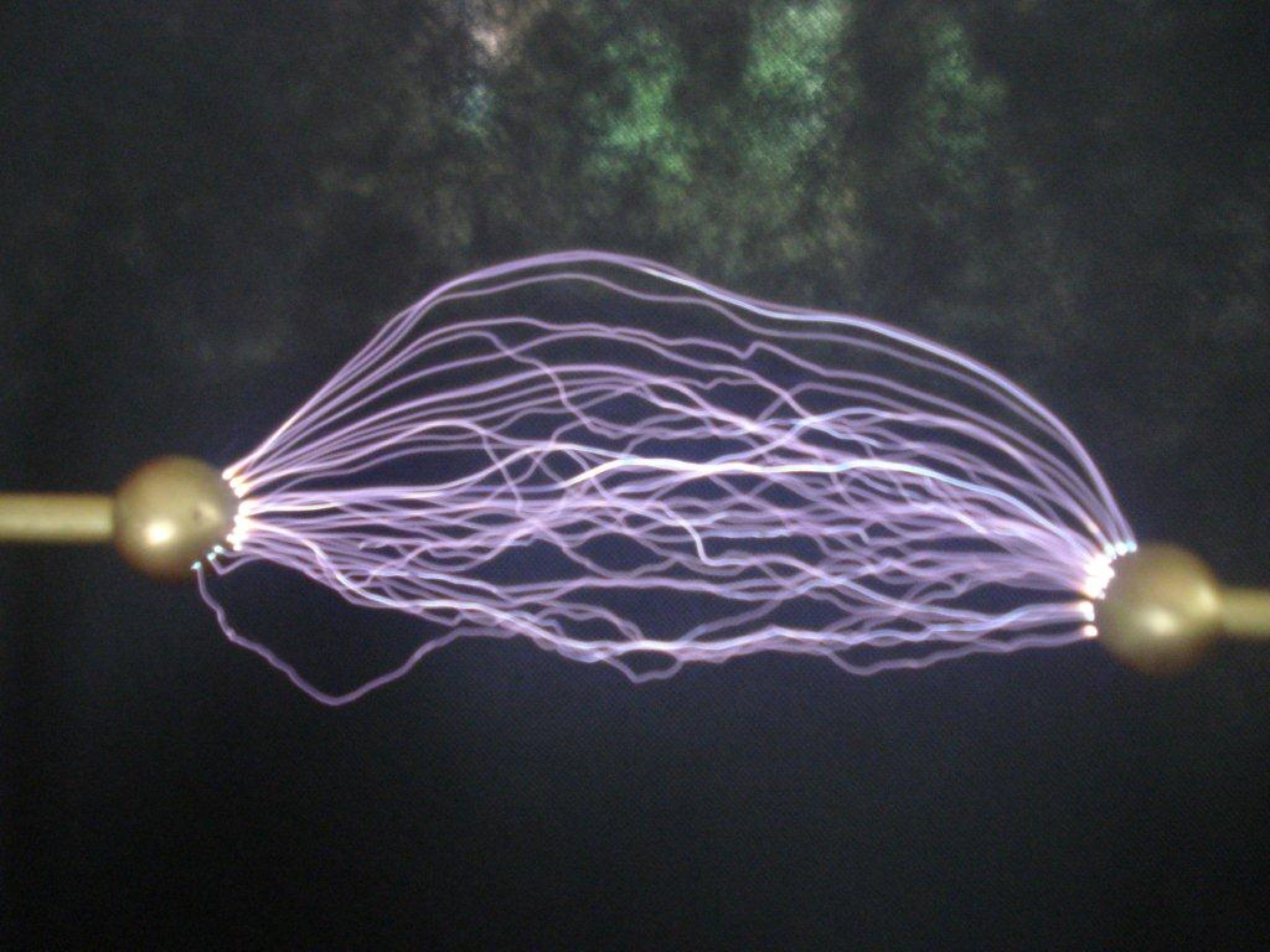


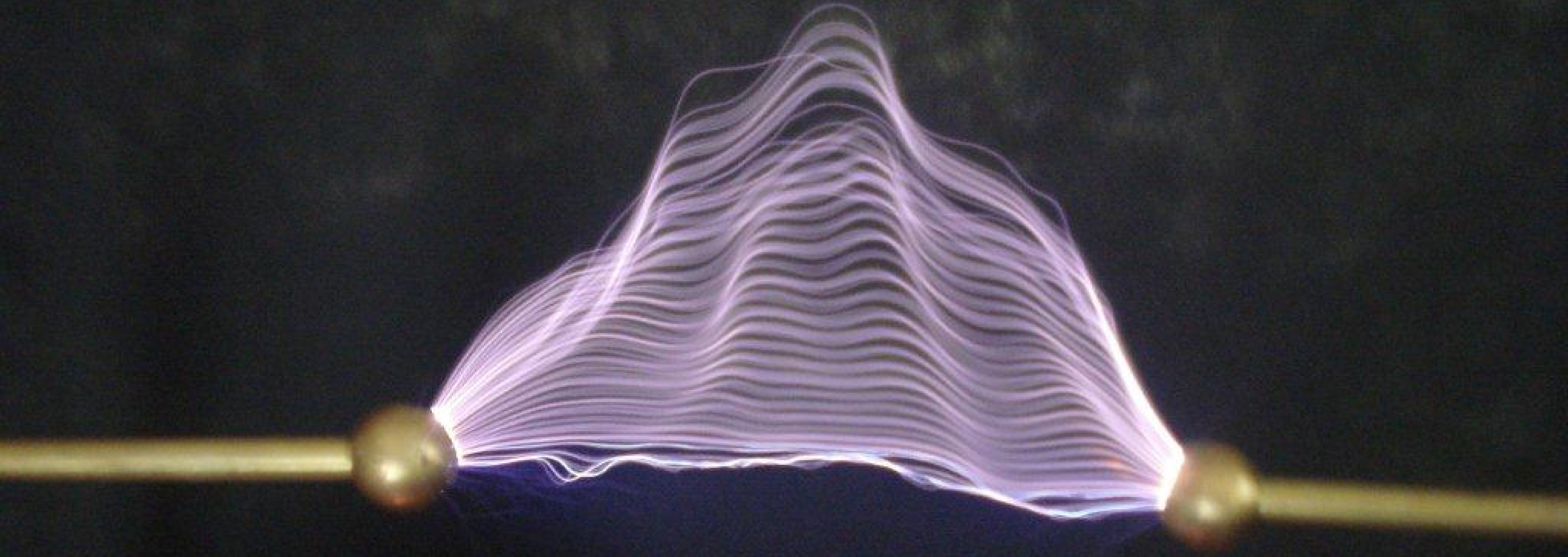


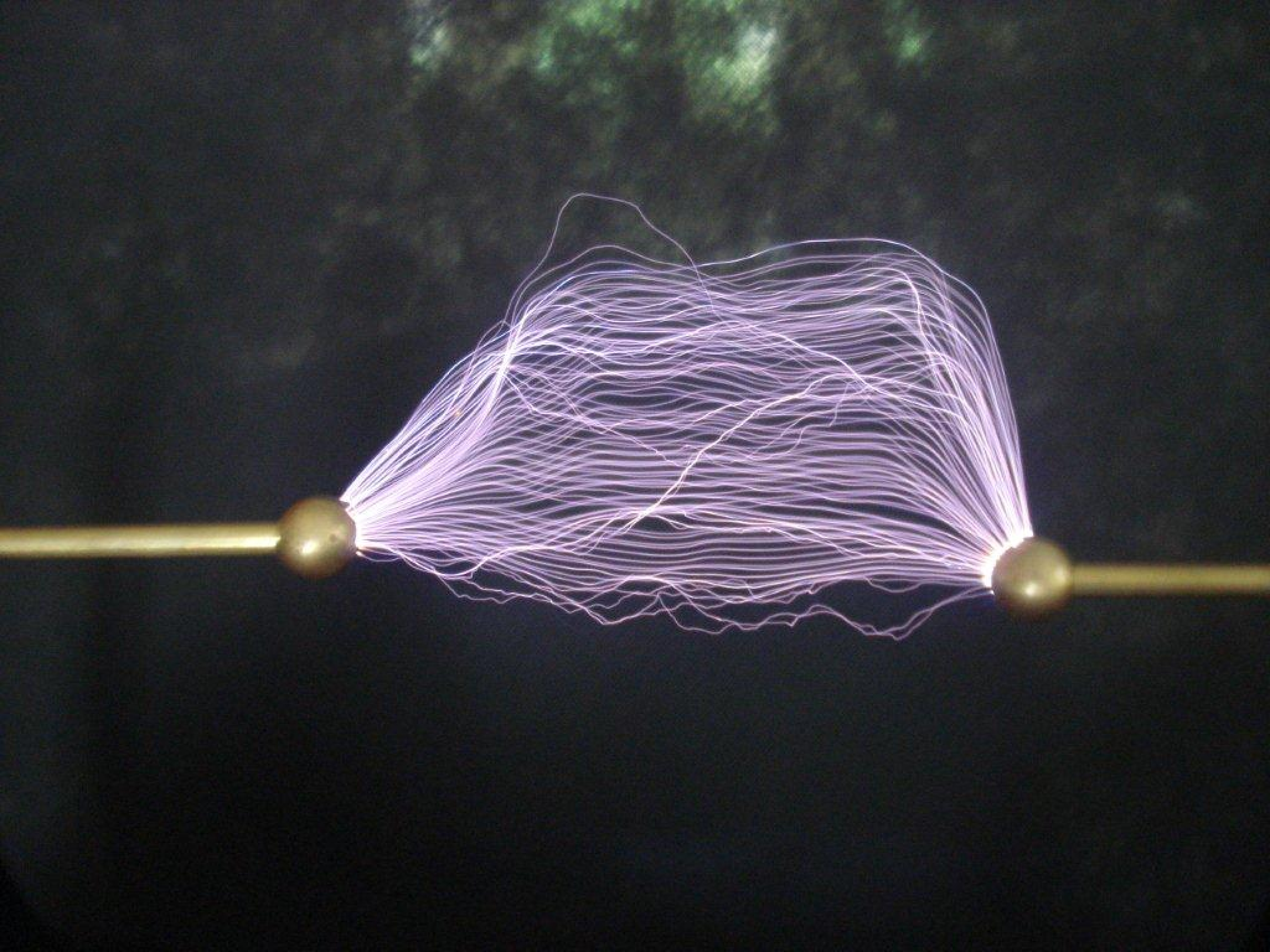


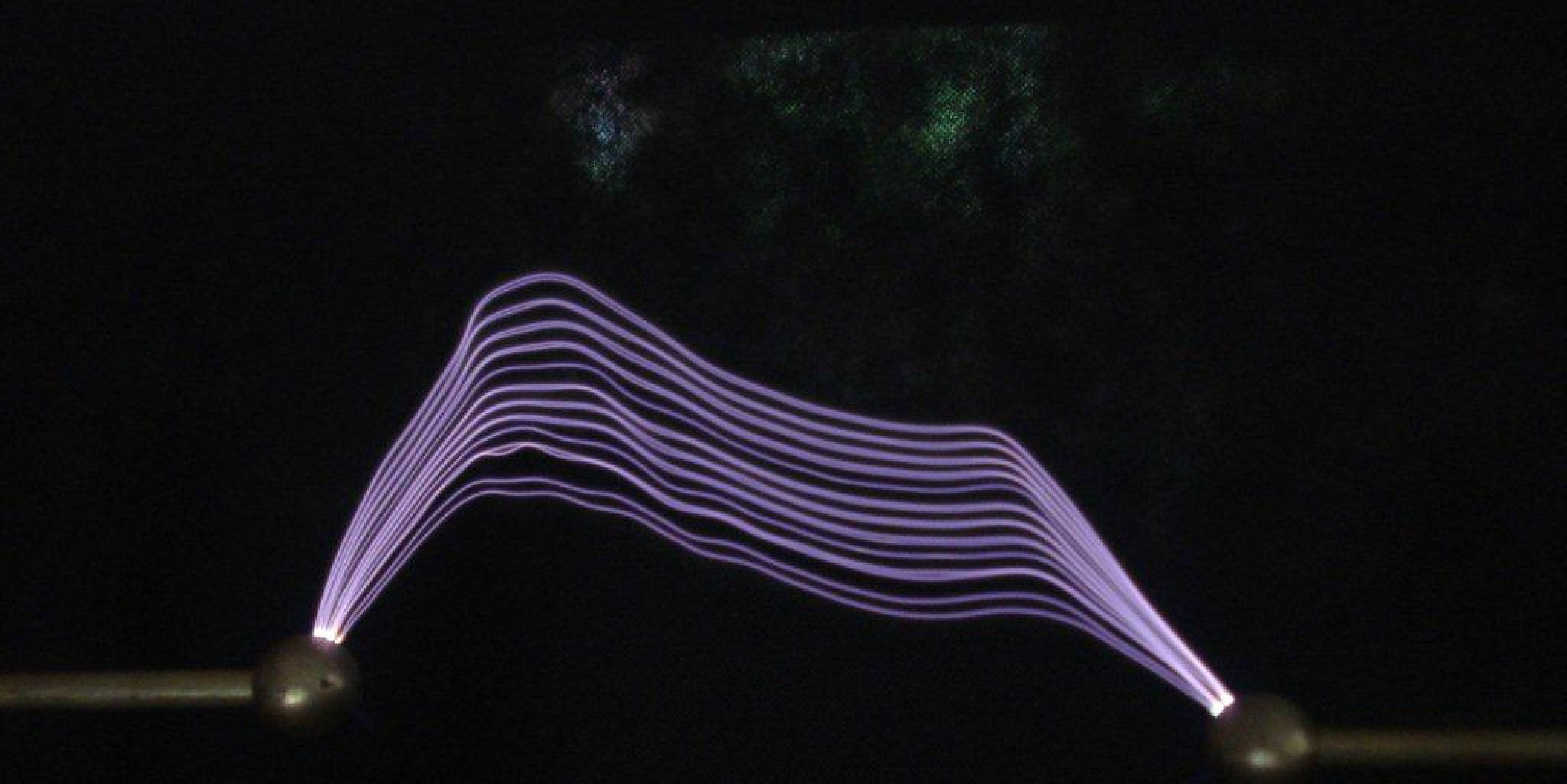

THE KINRADE COIL
SWETT & LEWIS CO

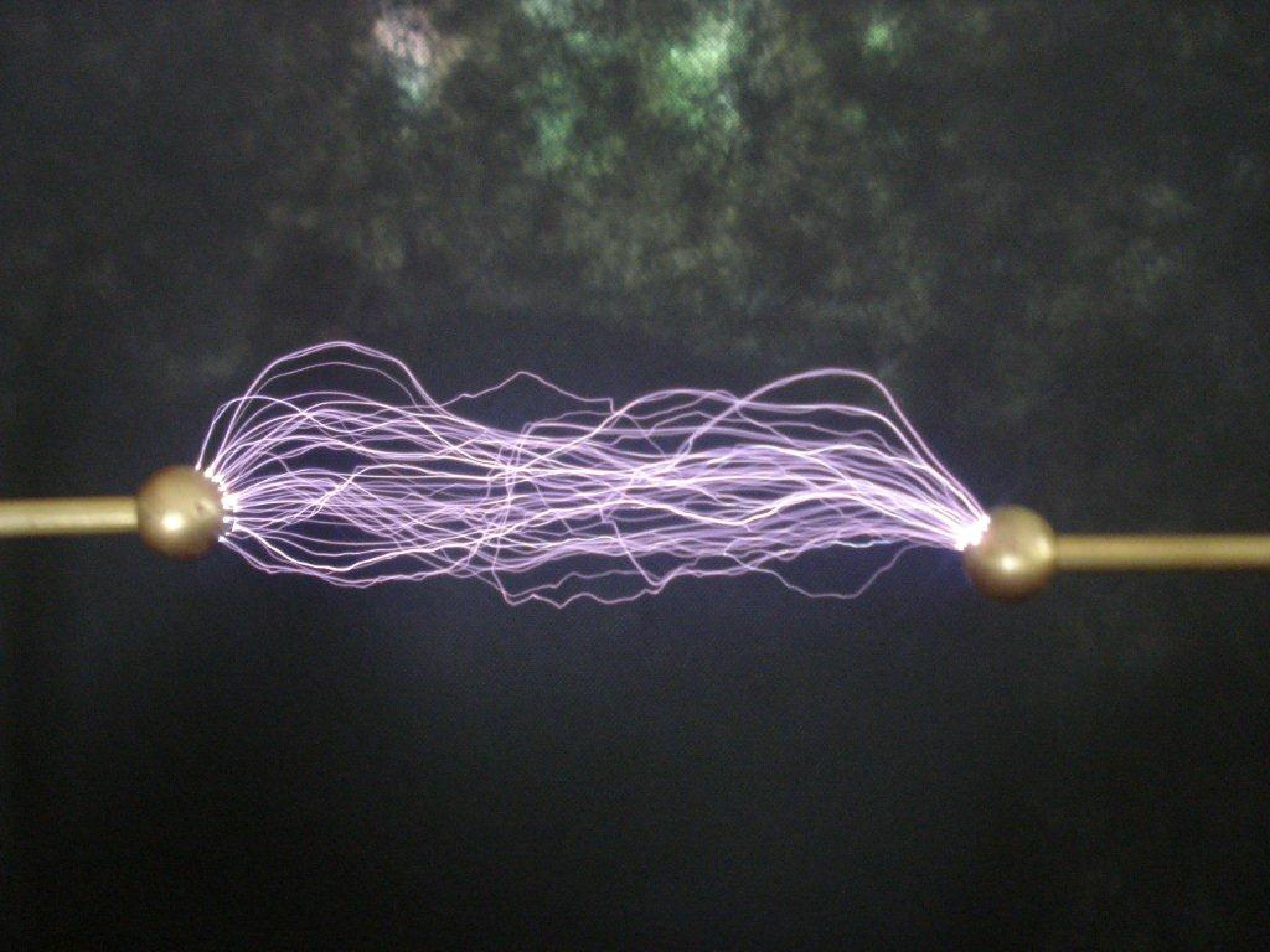

THE KINRAIDE COIL
HOWARD JACKSON
SWETT & LEWIS CO.
CYCLES

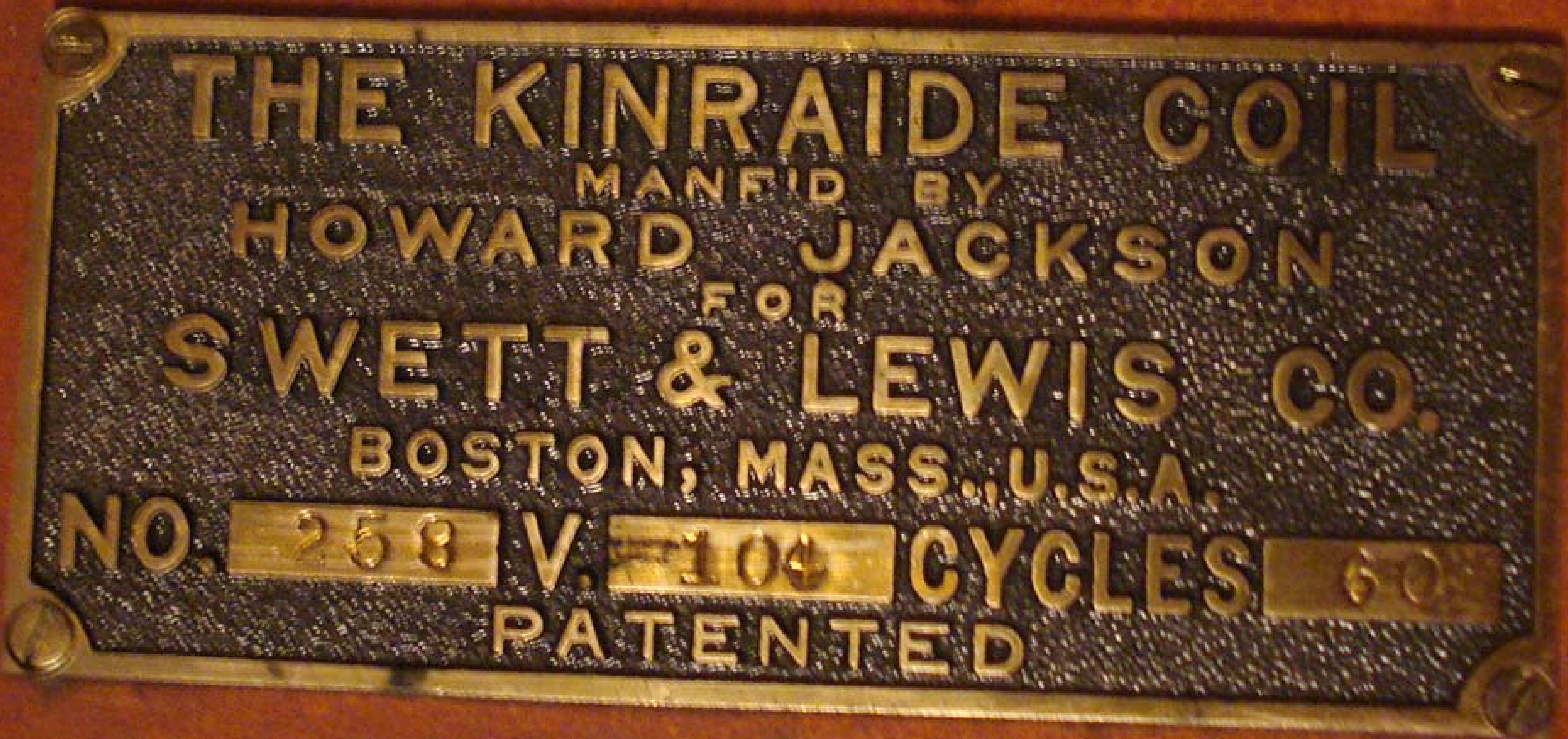












THE KINRAIDE COIL

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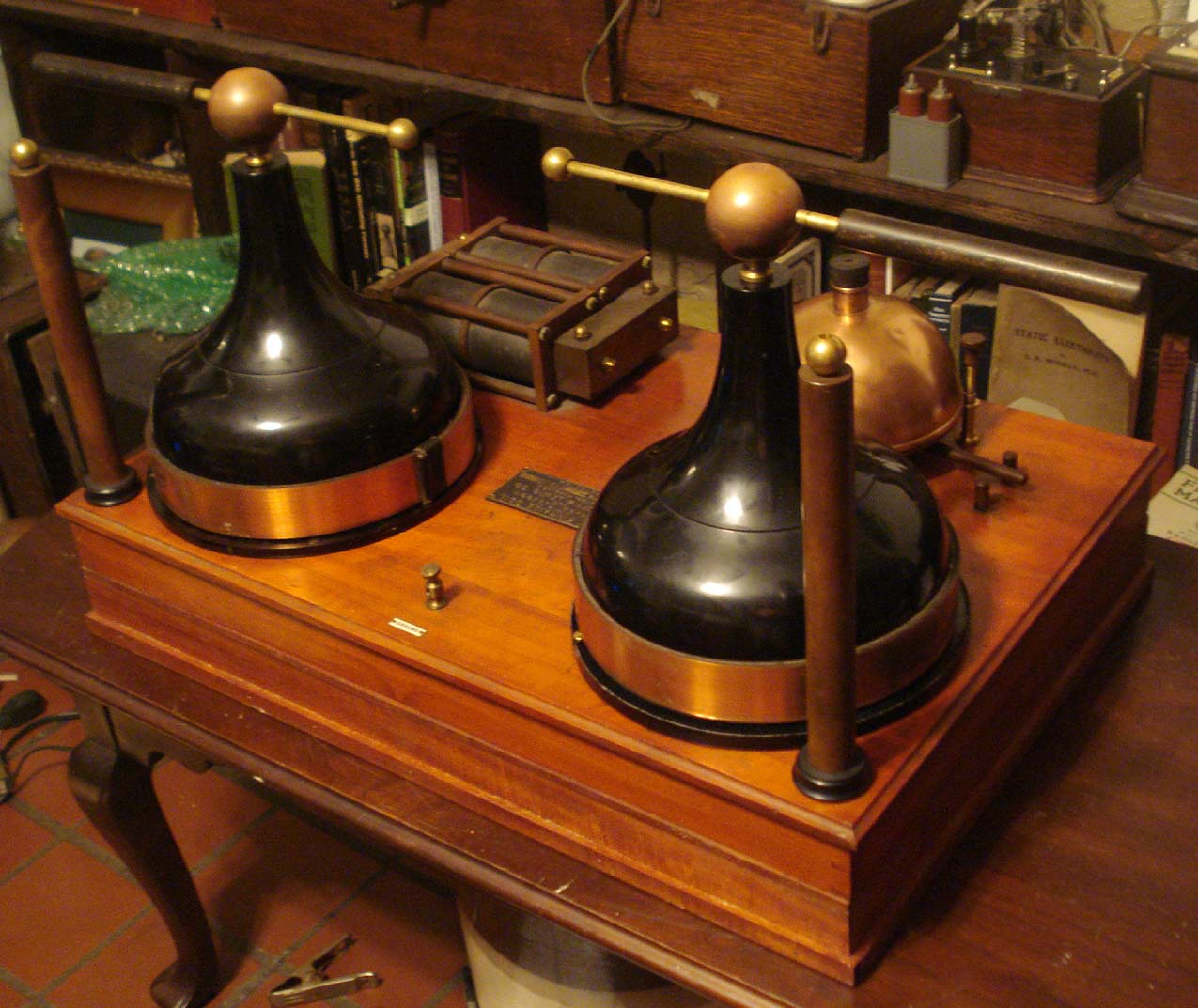
BOSTON, MASS., U.S.A.

NO. 258 V. 104 CYCLES 60

PATENTED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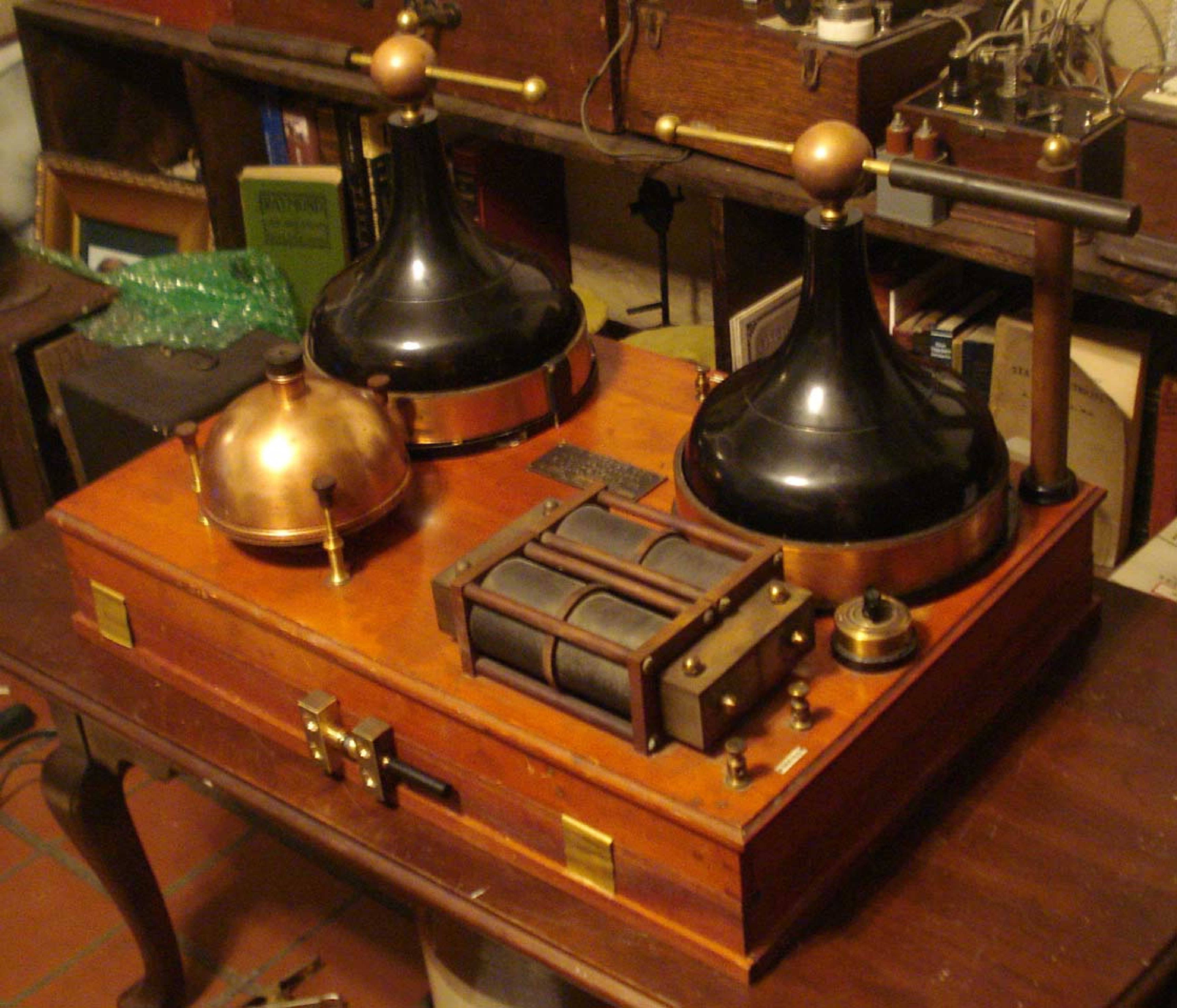
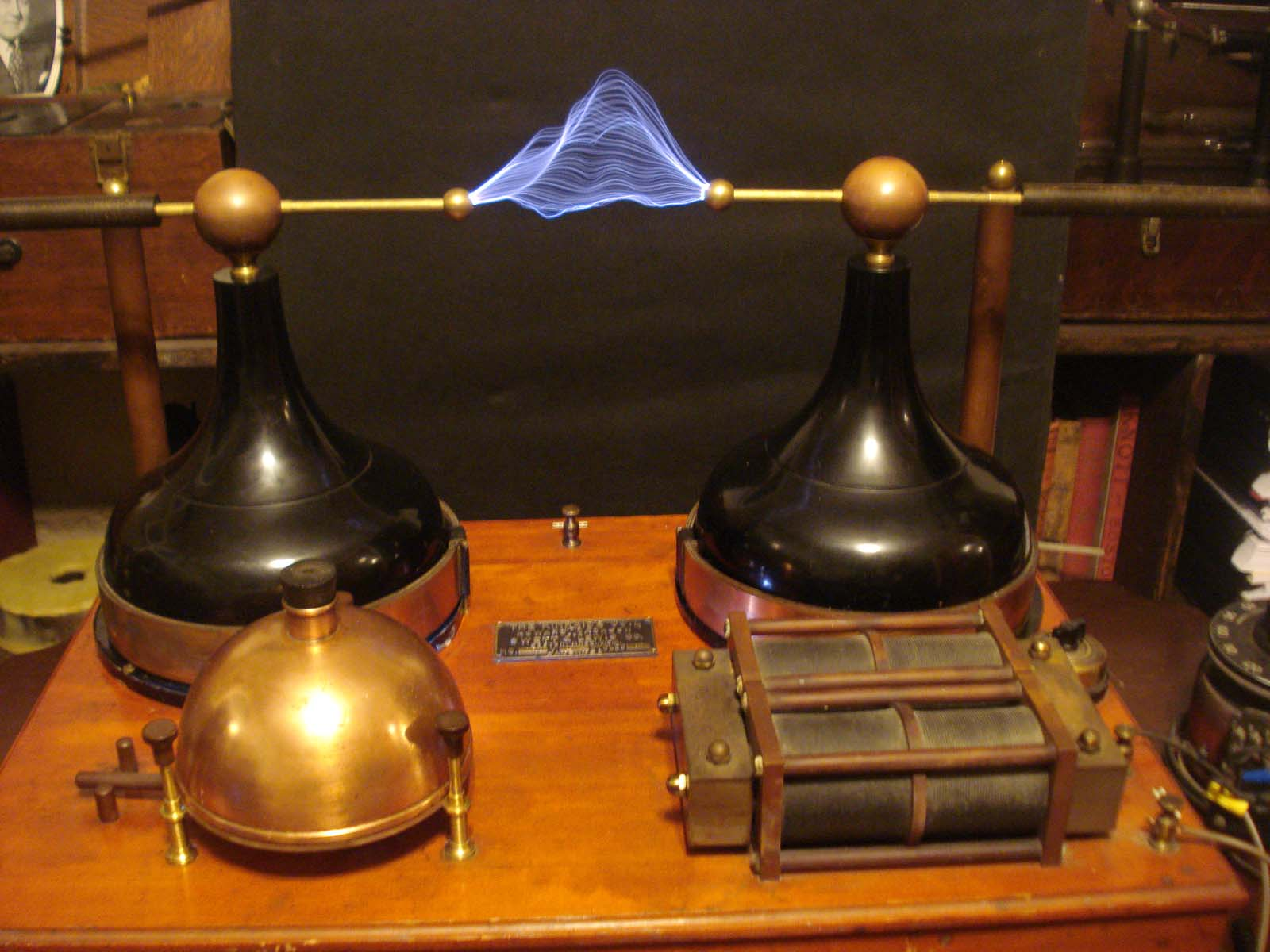
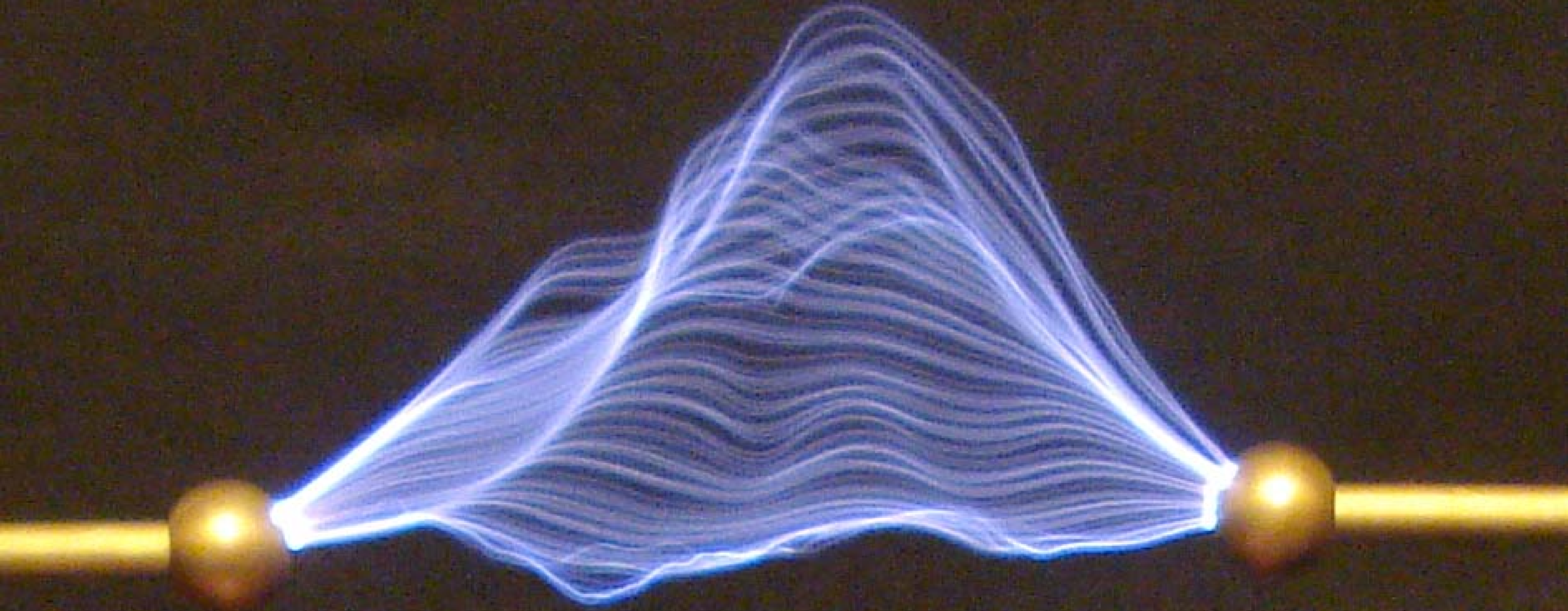
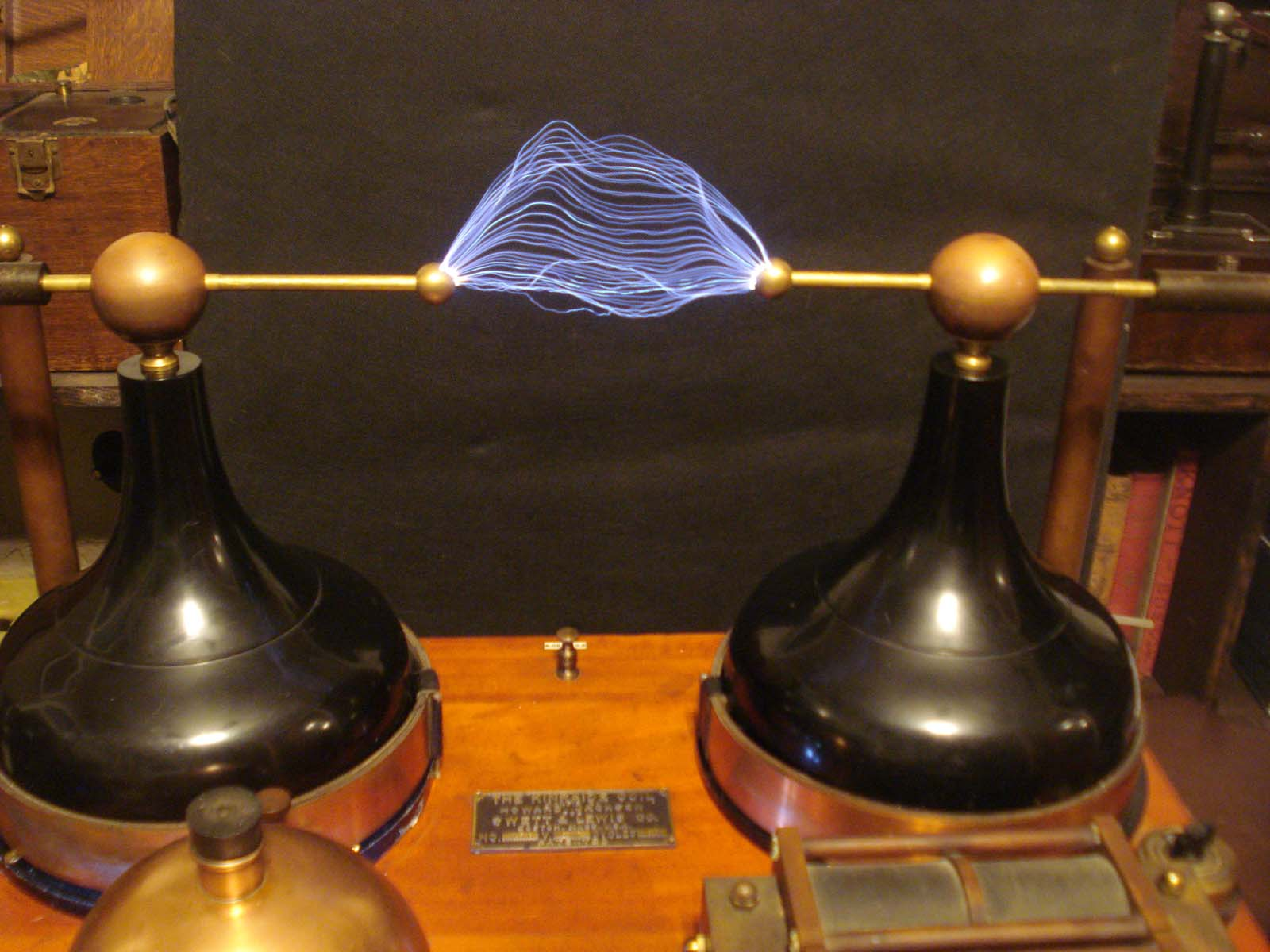
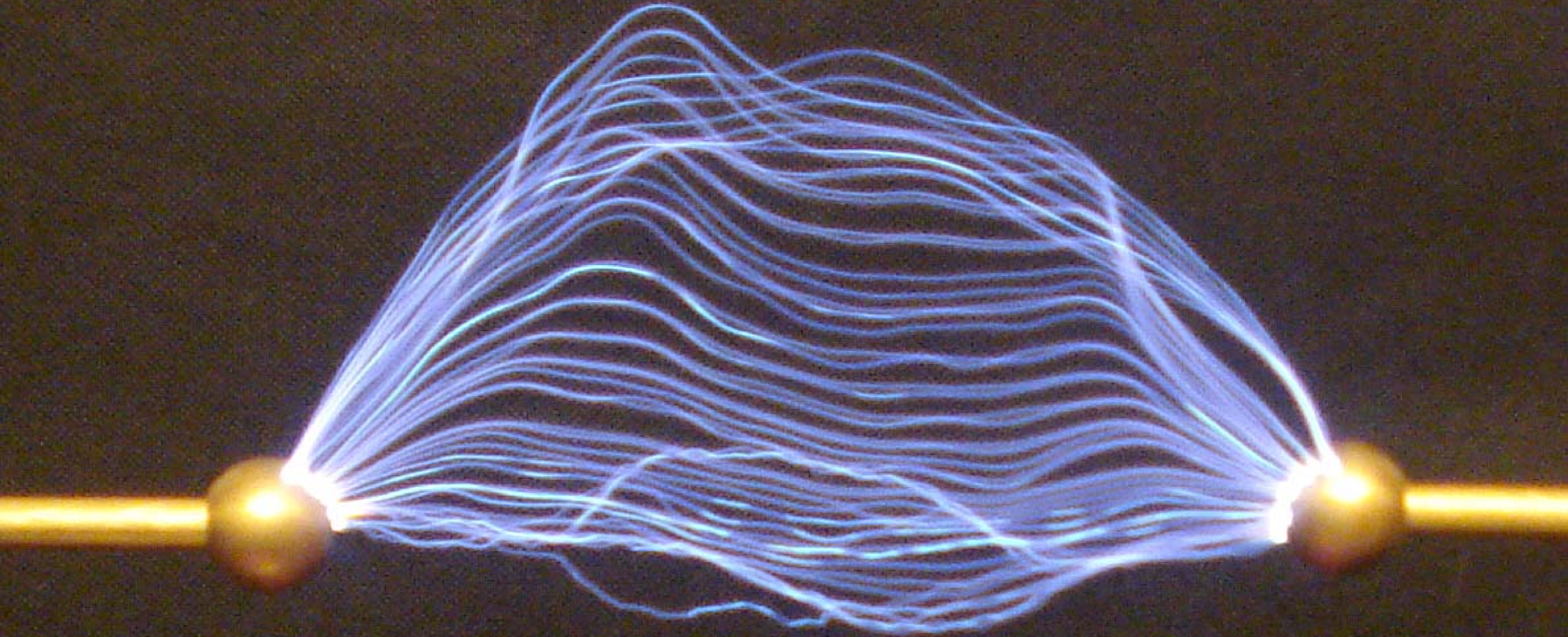
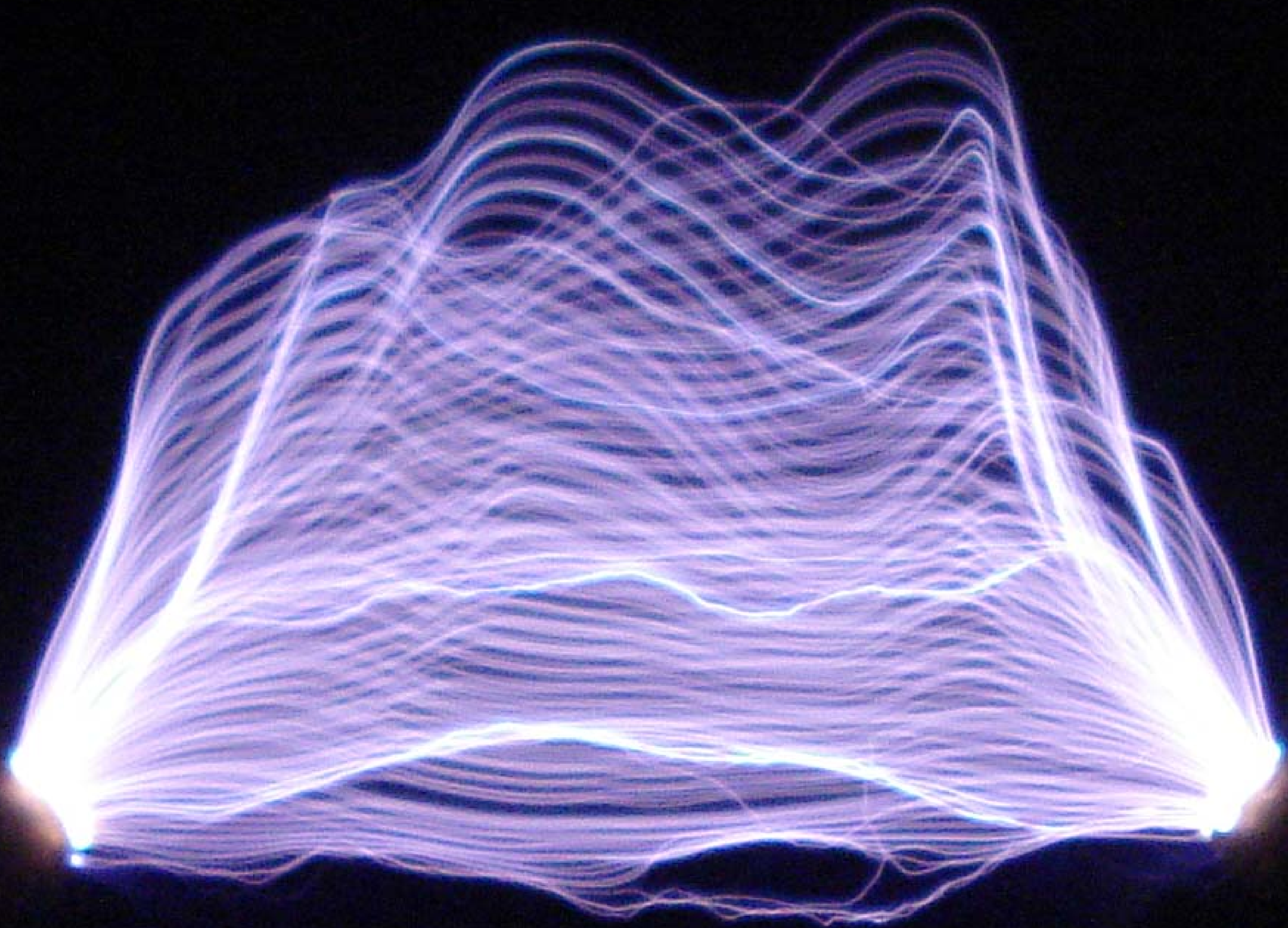


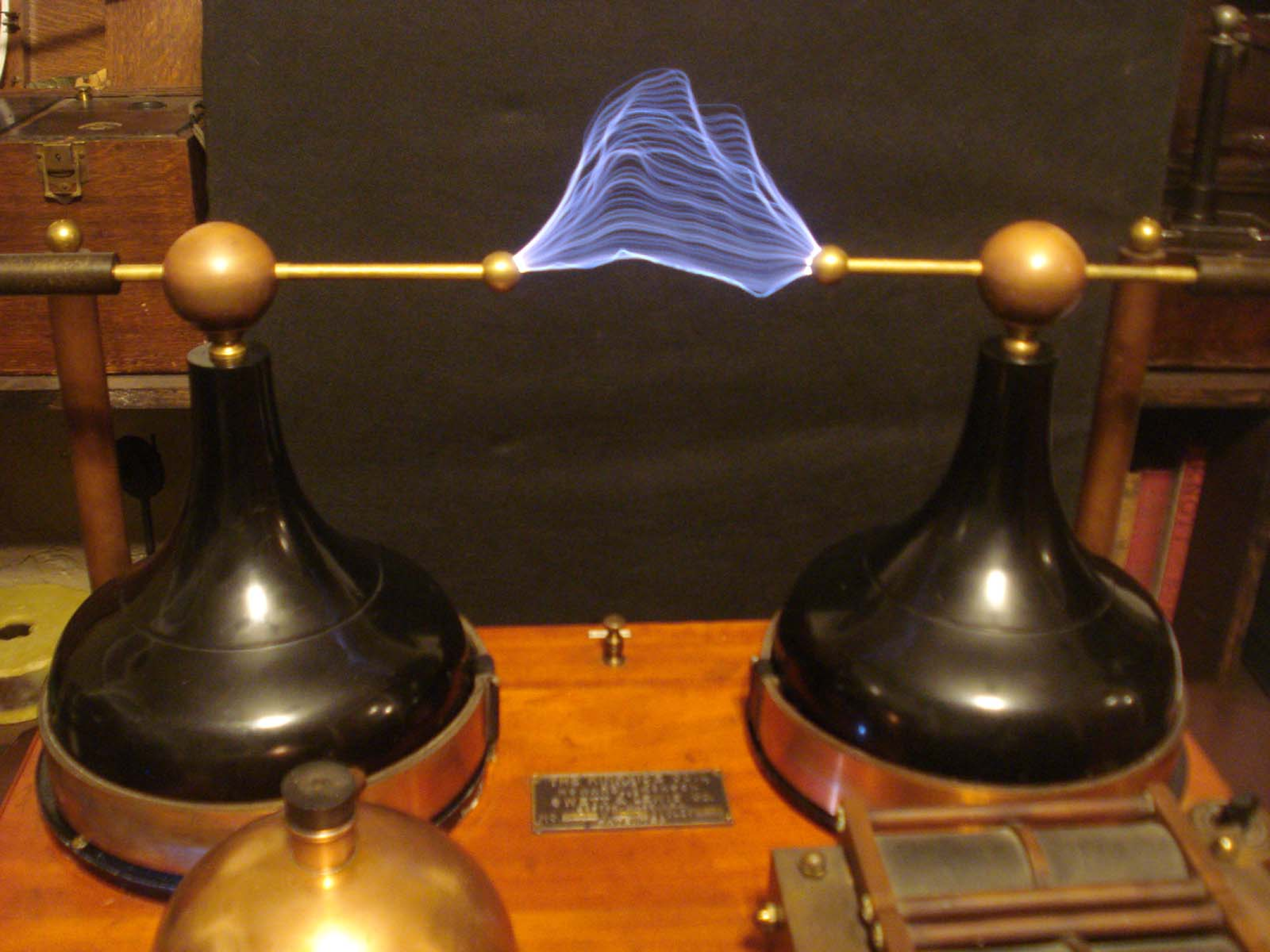





SWETT & LEWIS CO.







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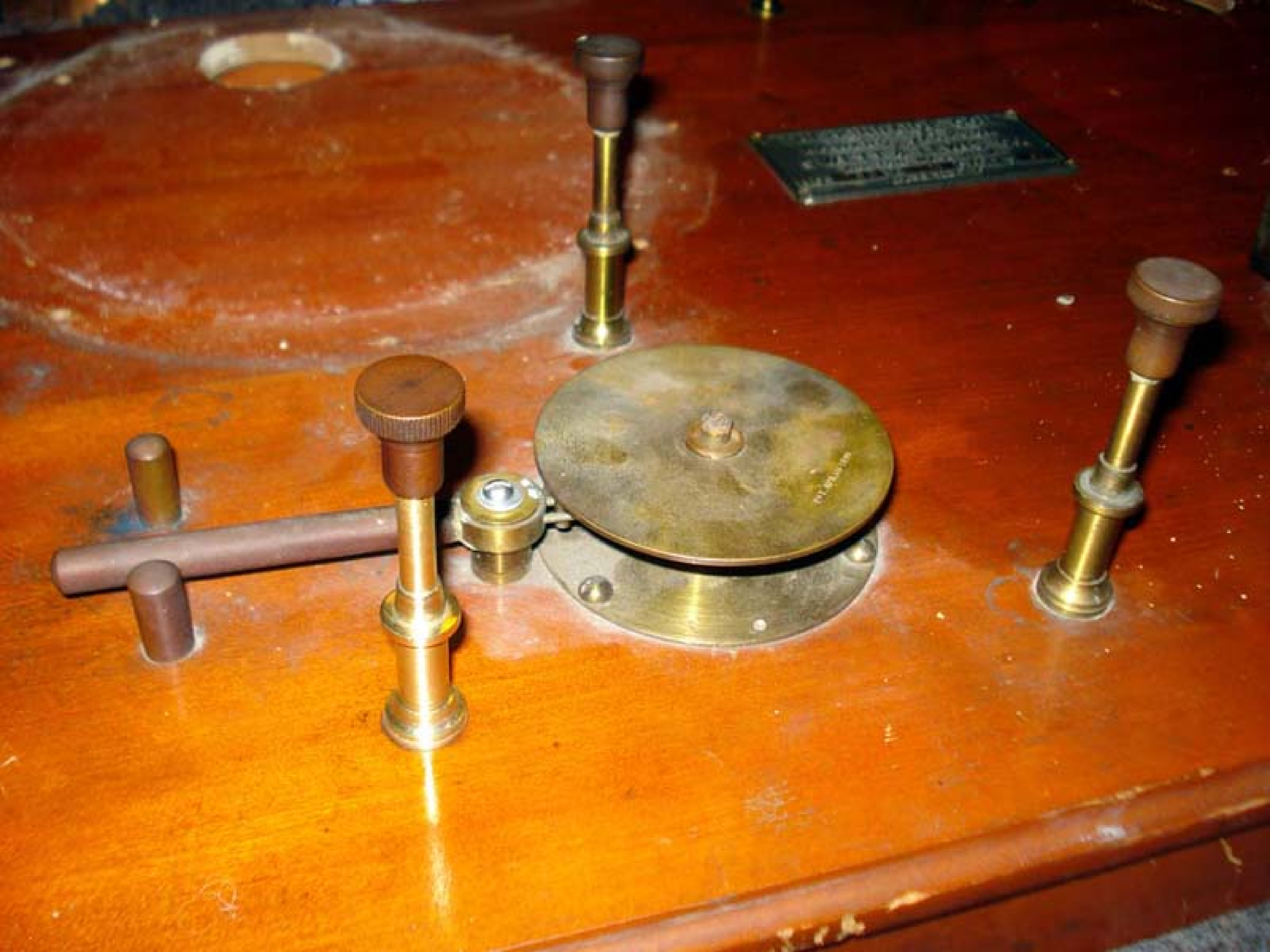

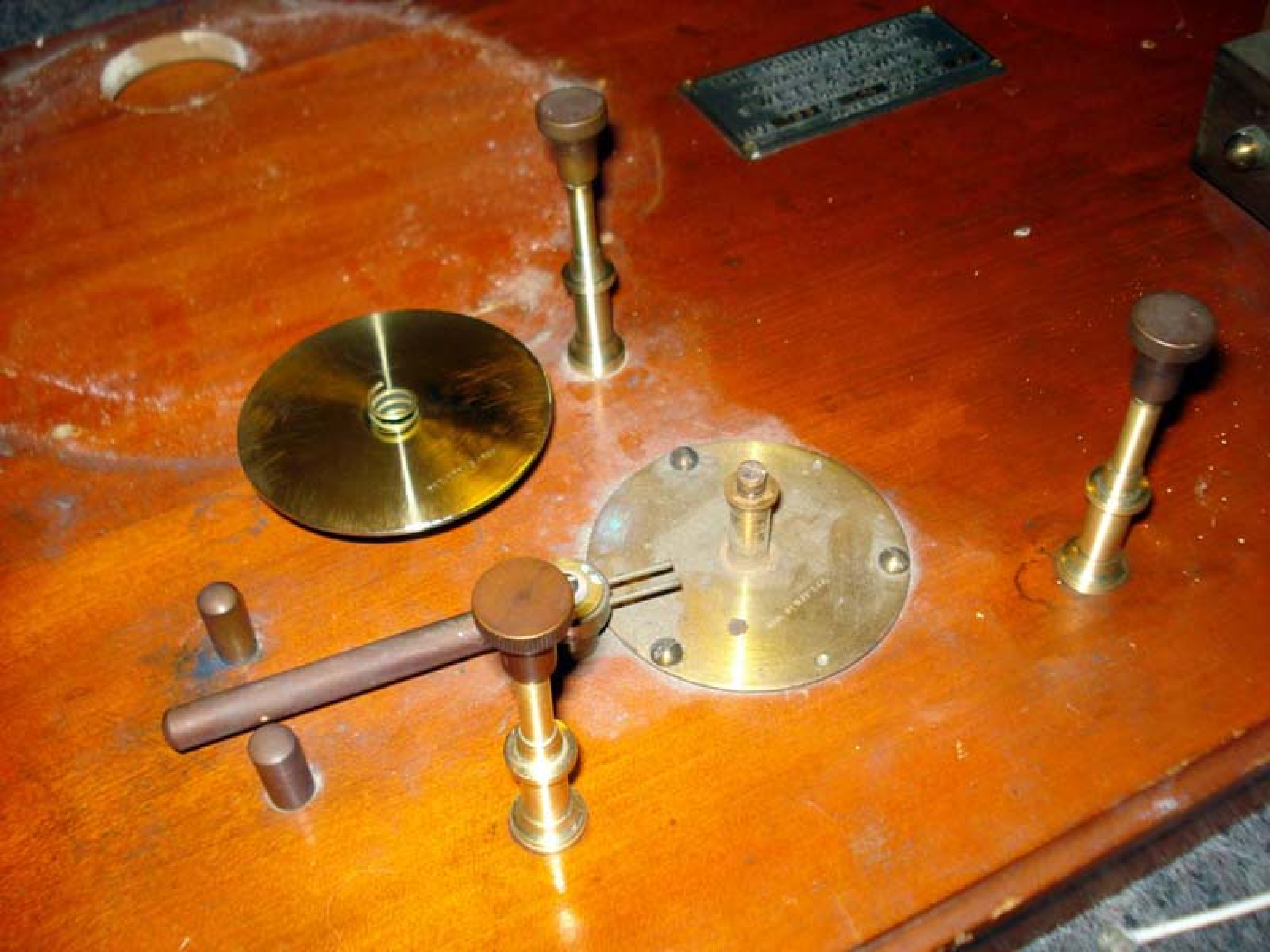

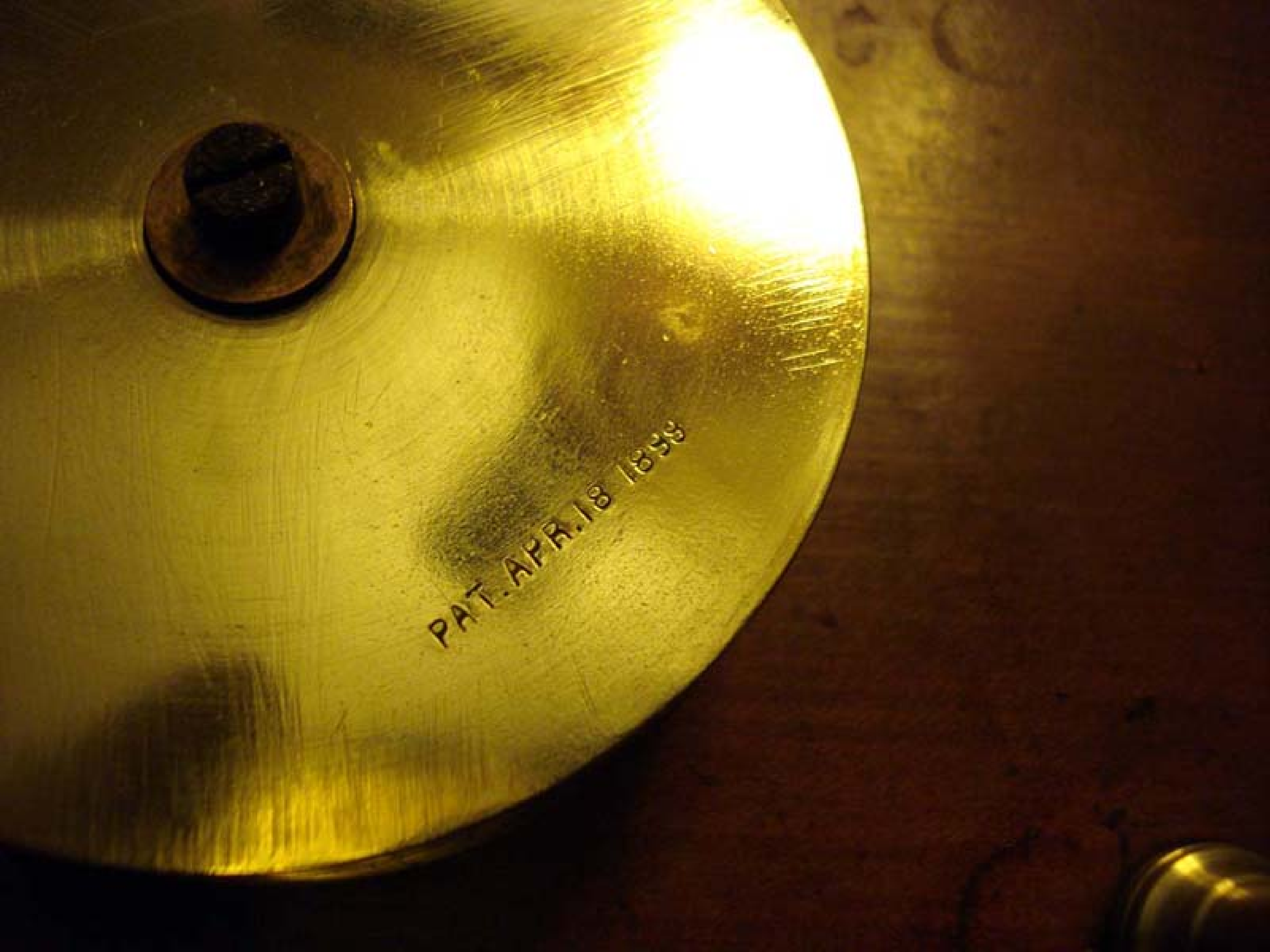
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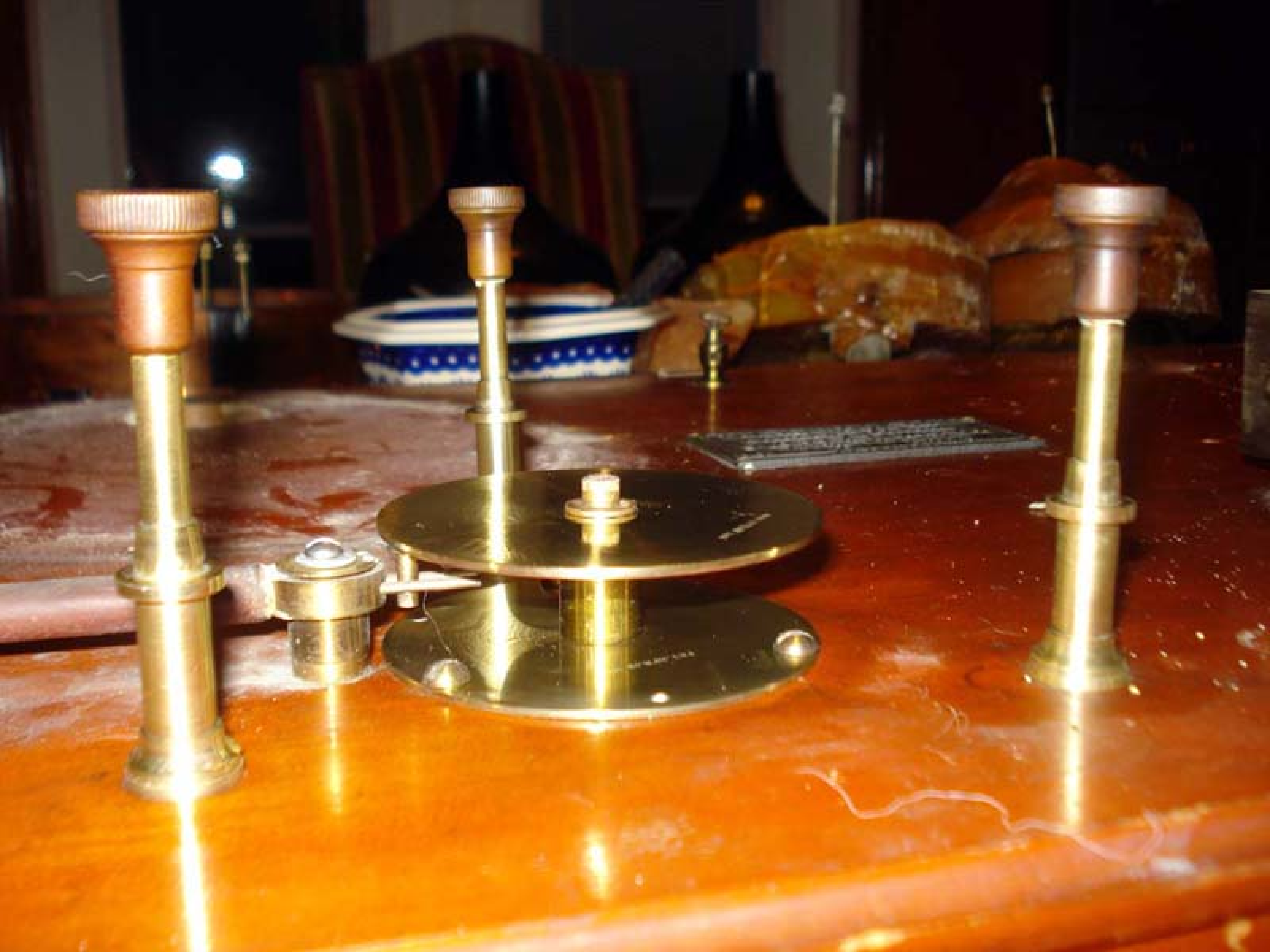
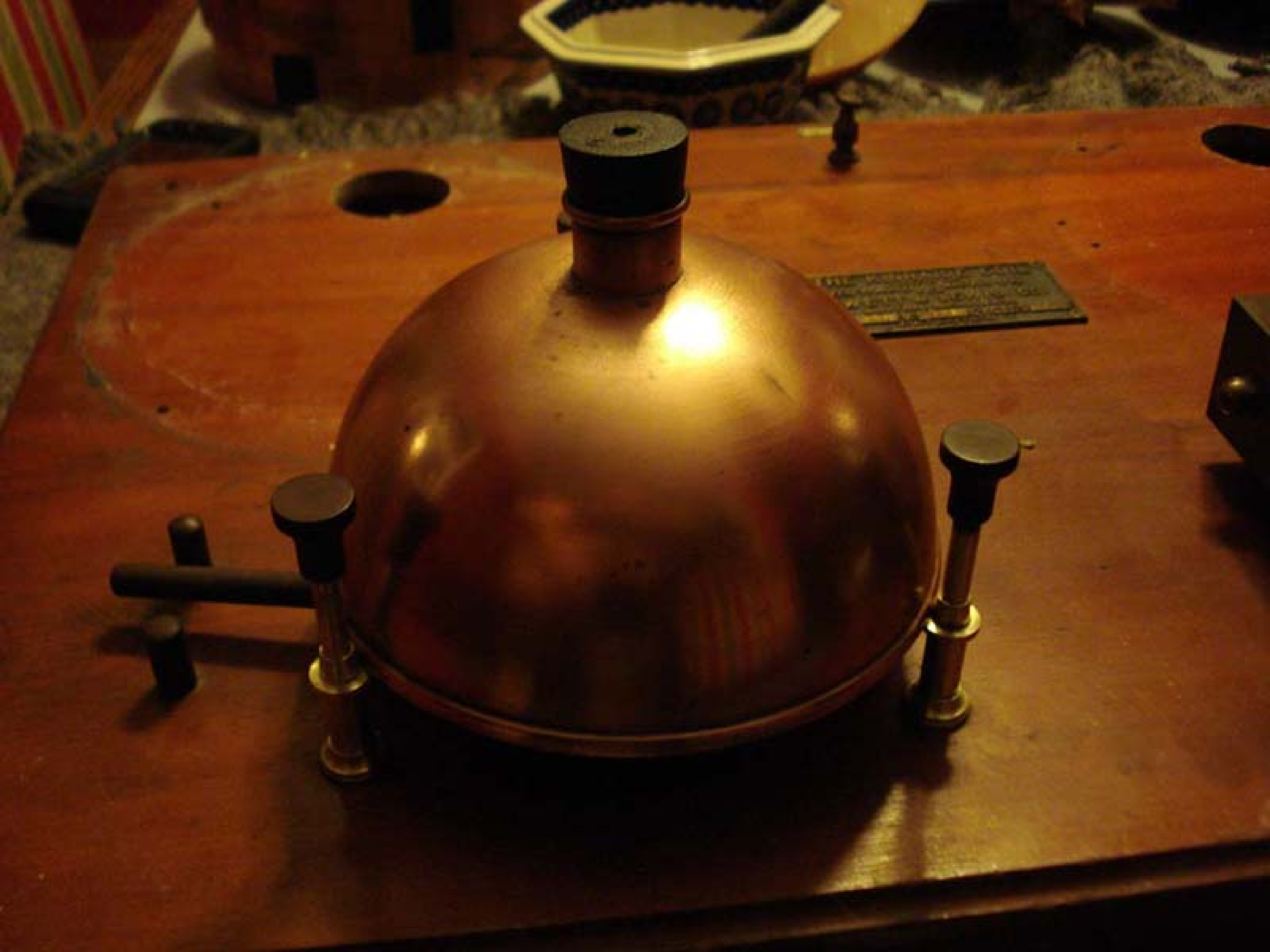
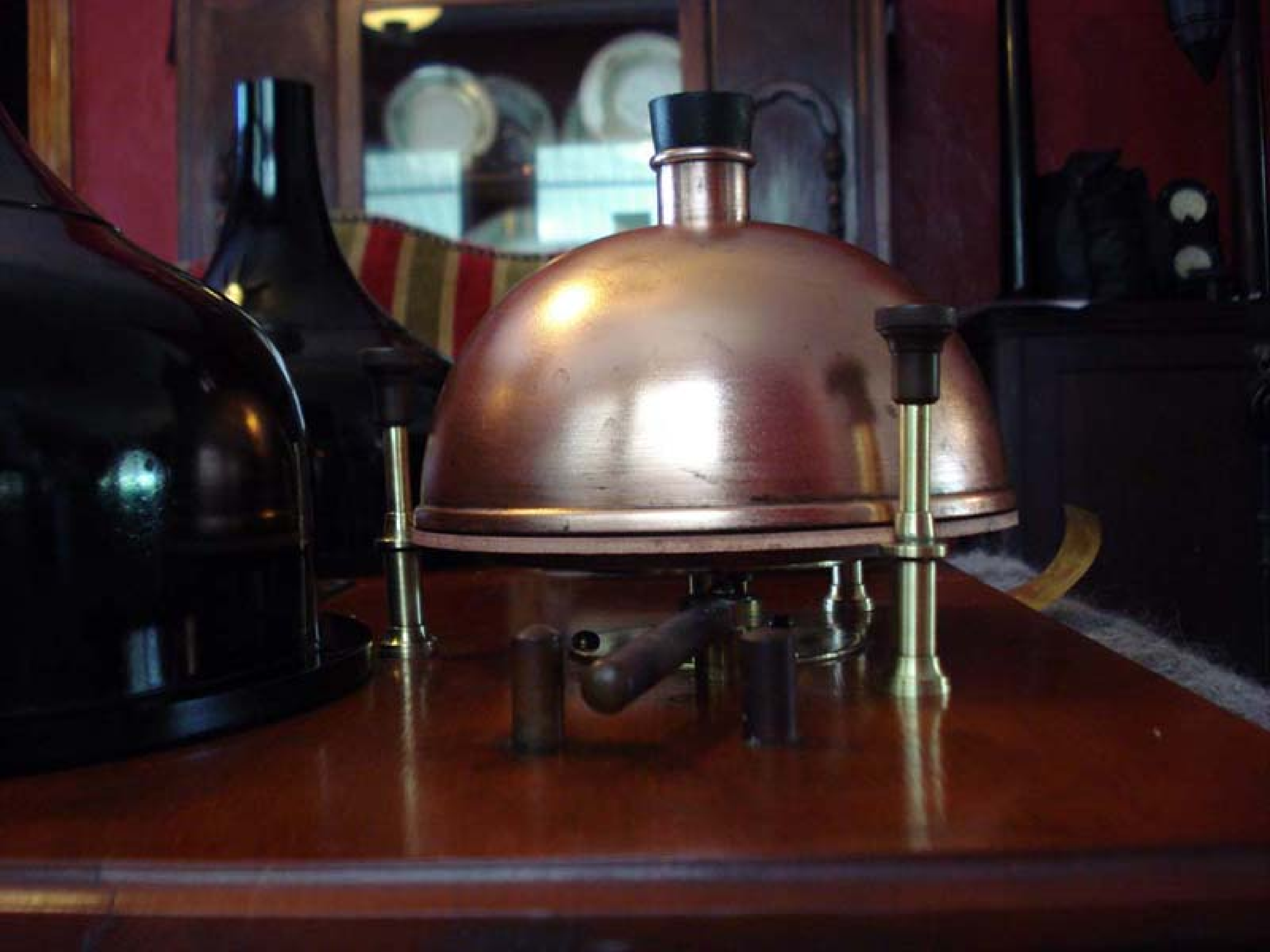
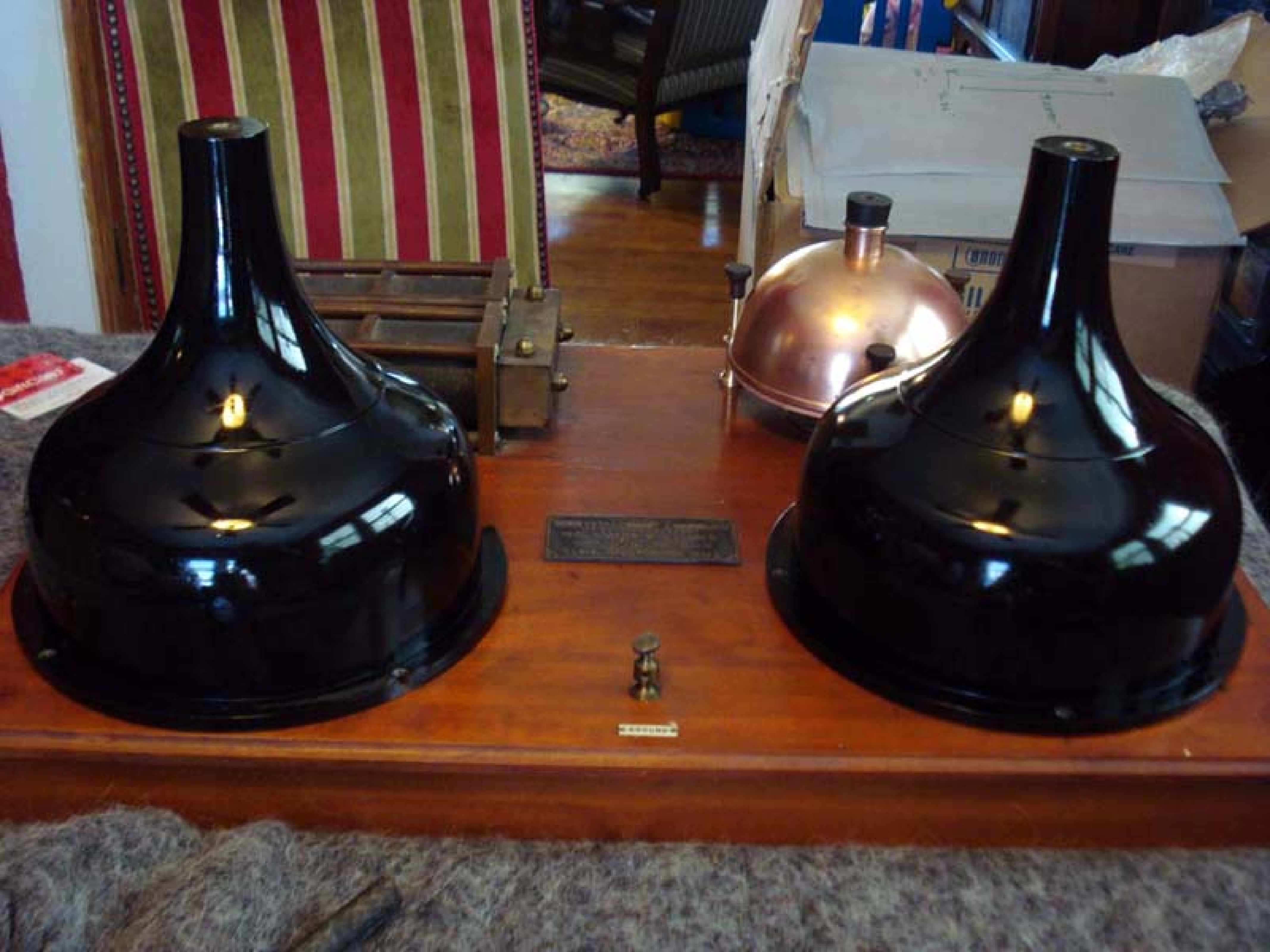
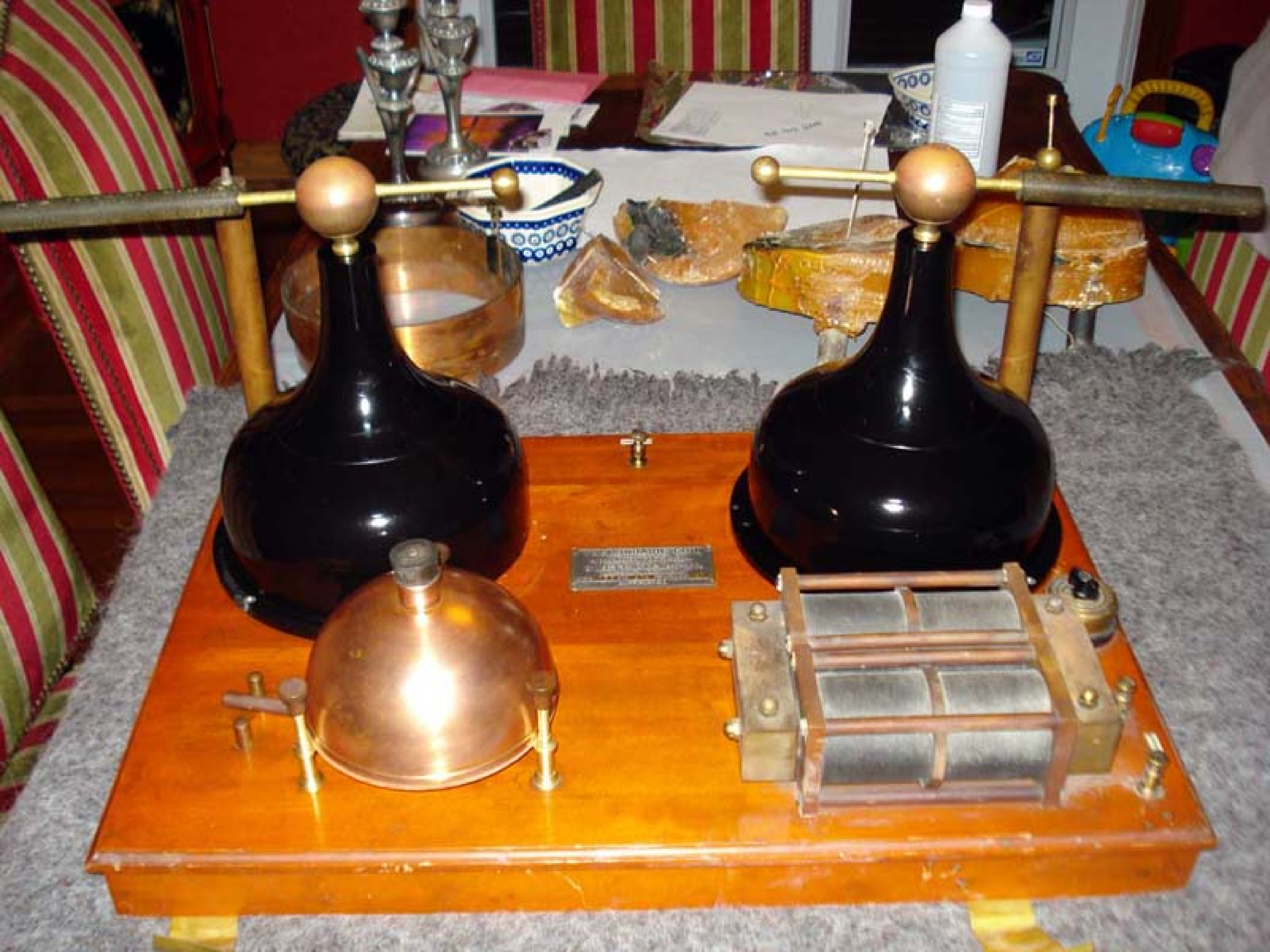
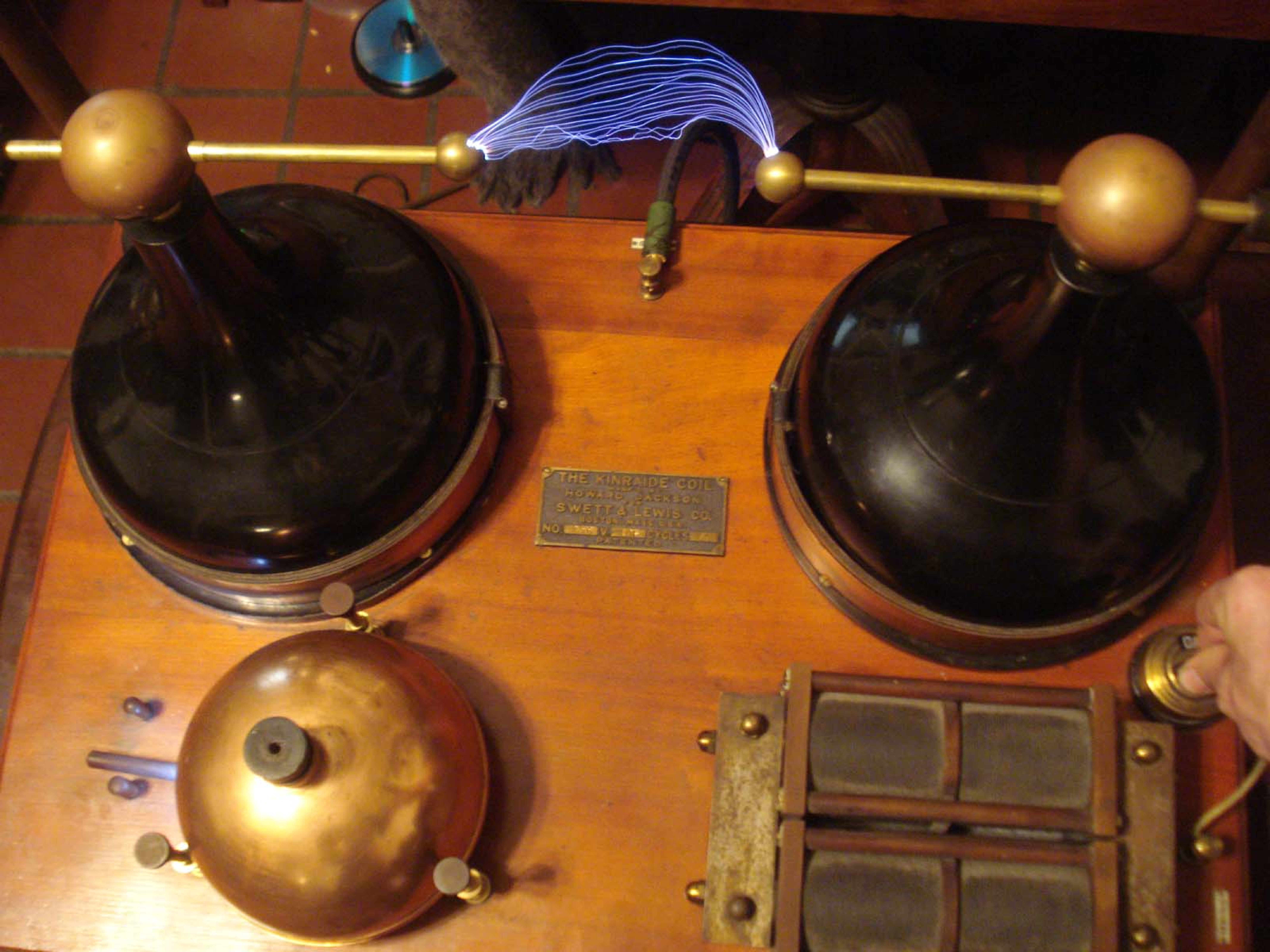


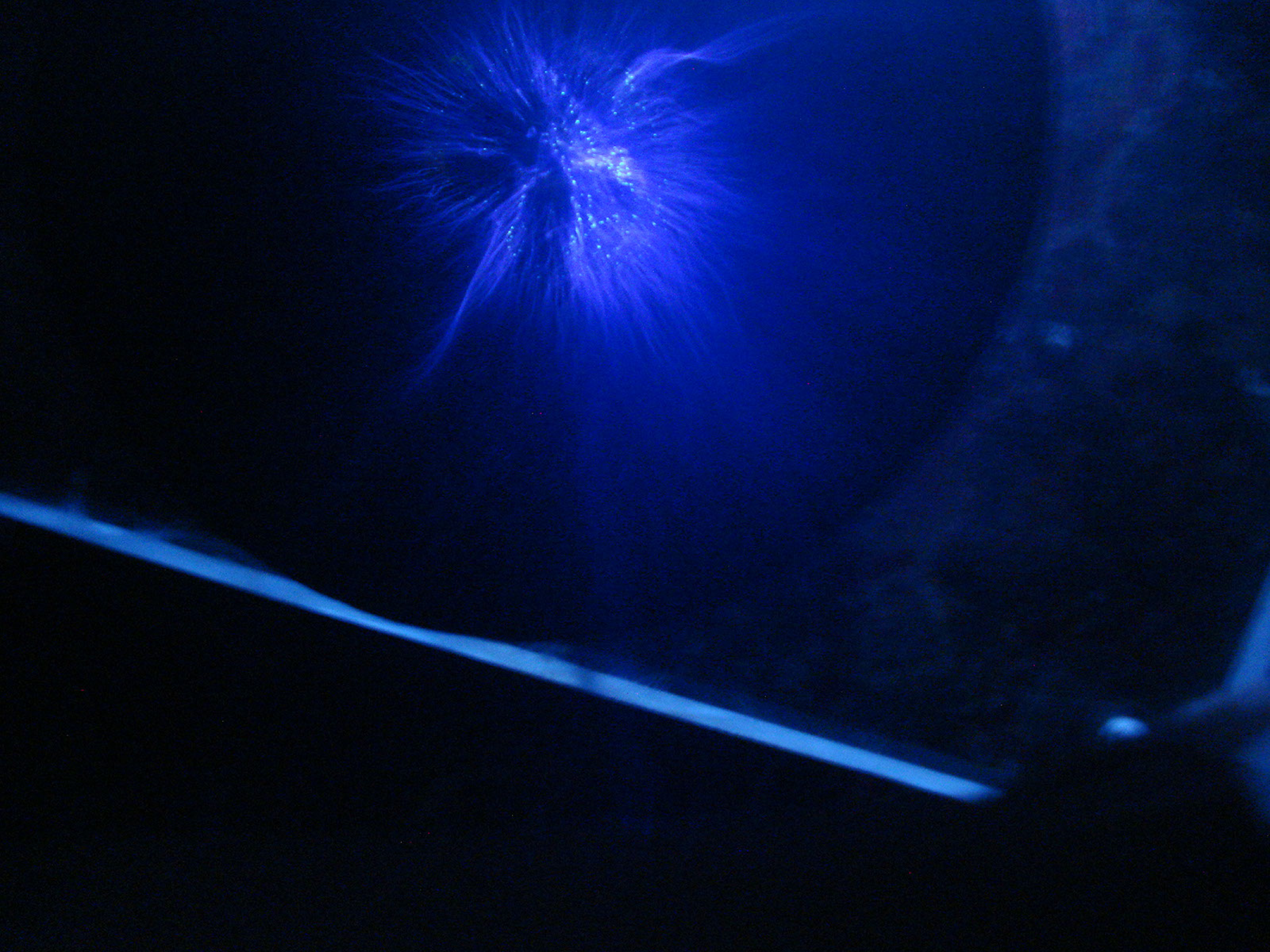


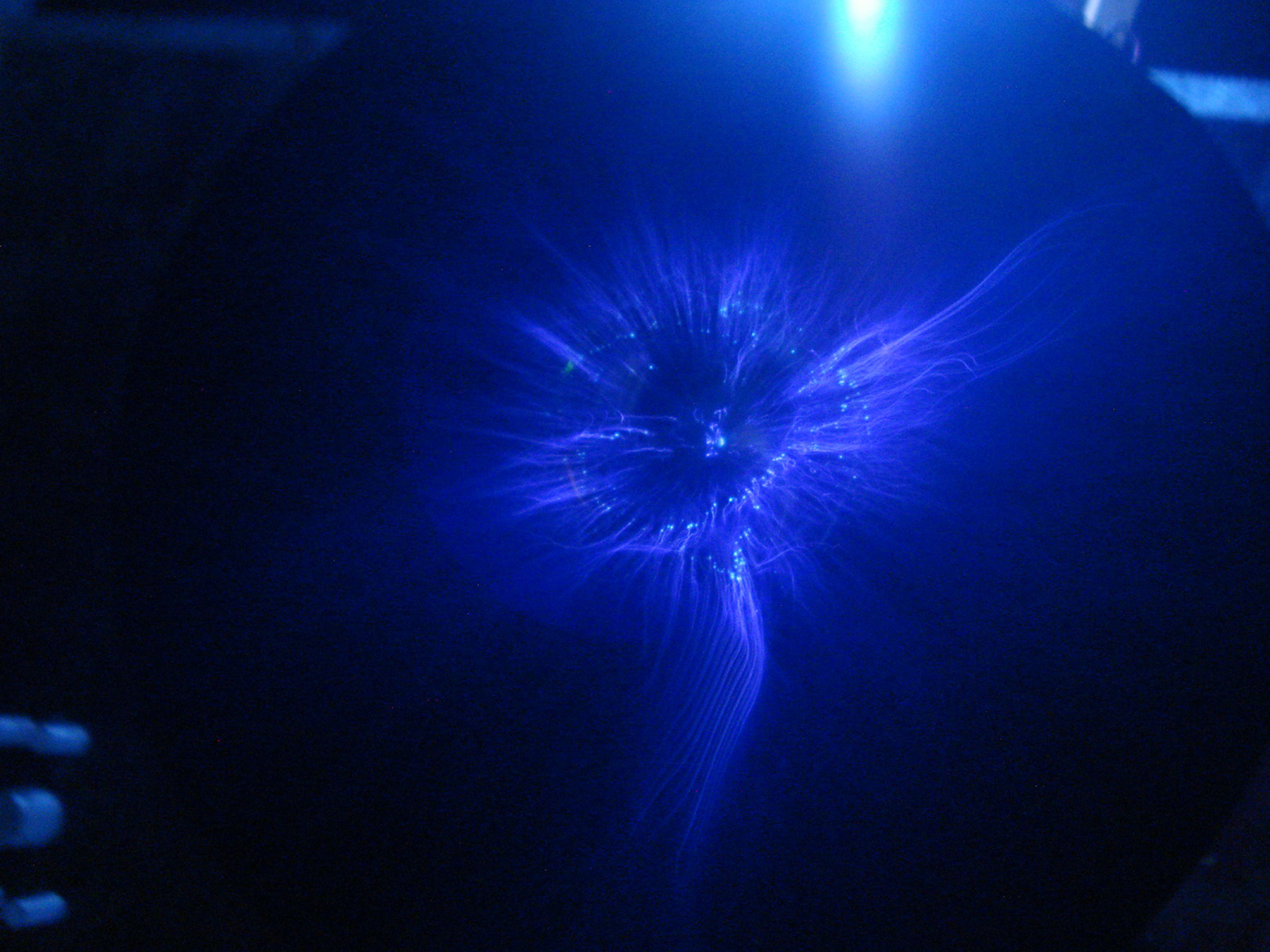


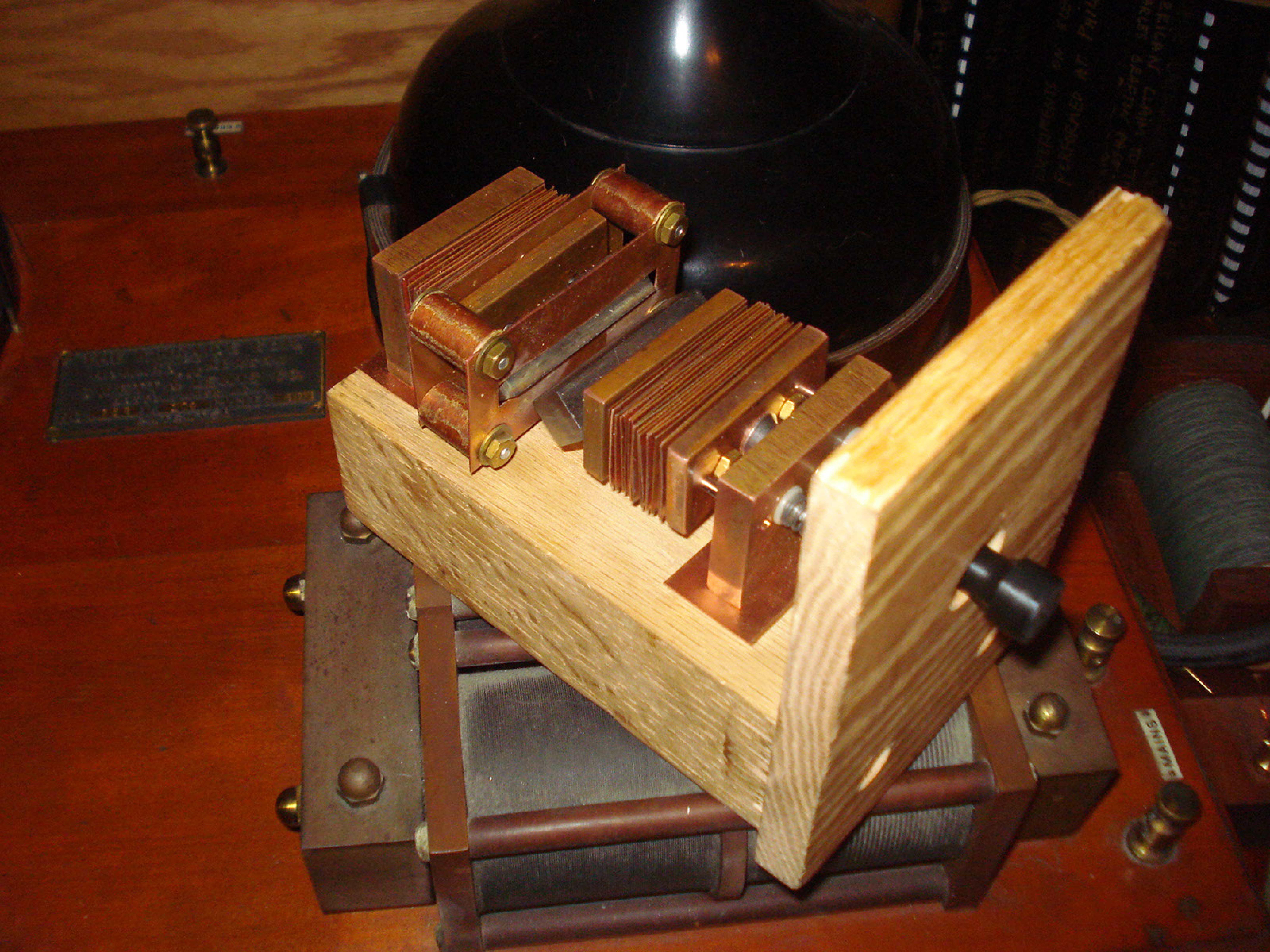





THE KINRAIDE COIL
HOWARD JACKSON
SWETT & LEWIS CO.
BOSTON MASS U.S.A.
NO. V CYCLES
PATENTED



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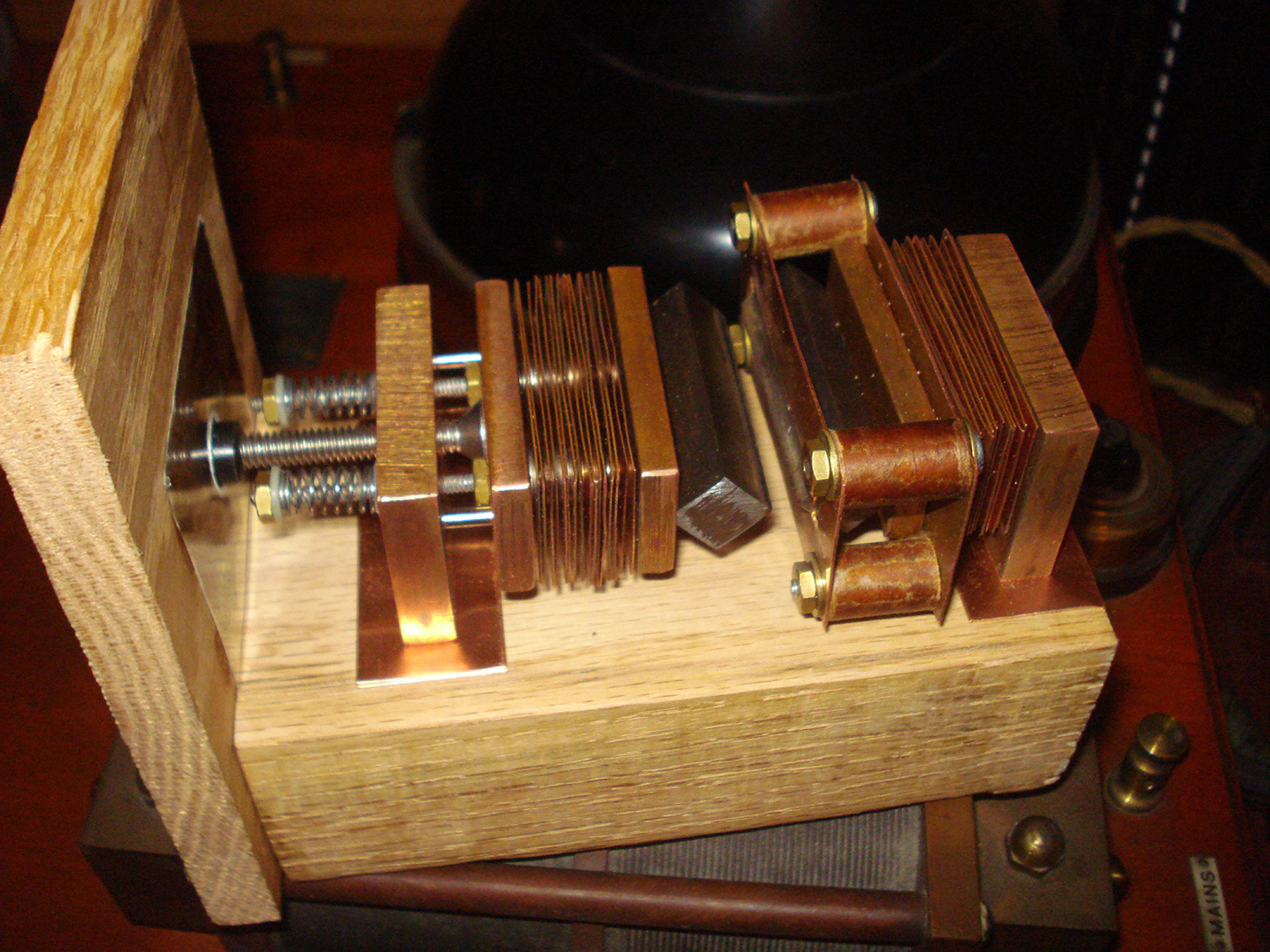
THE KINRAIDE COIL
CYCLES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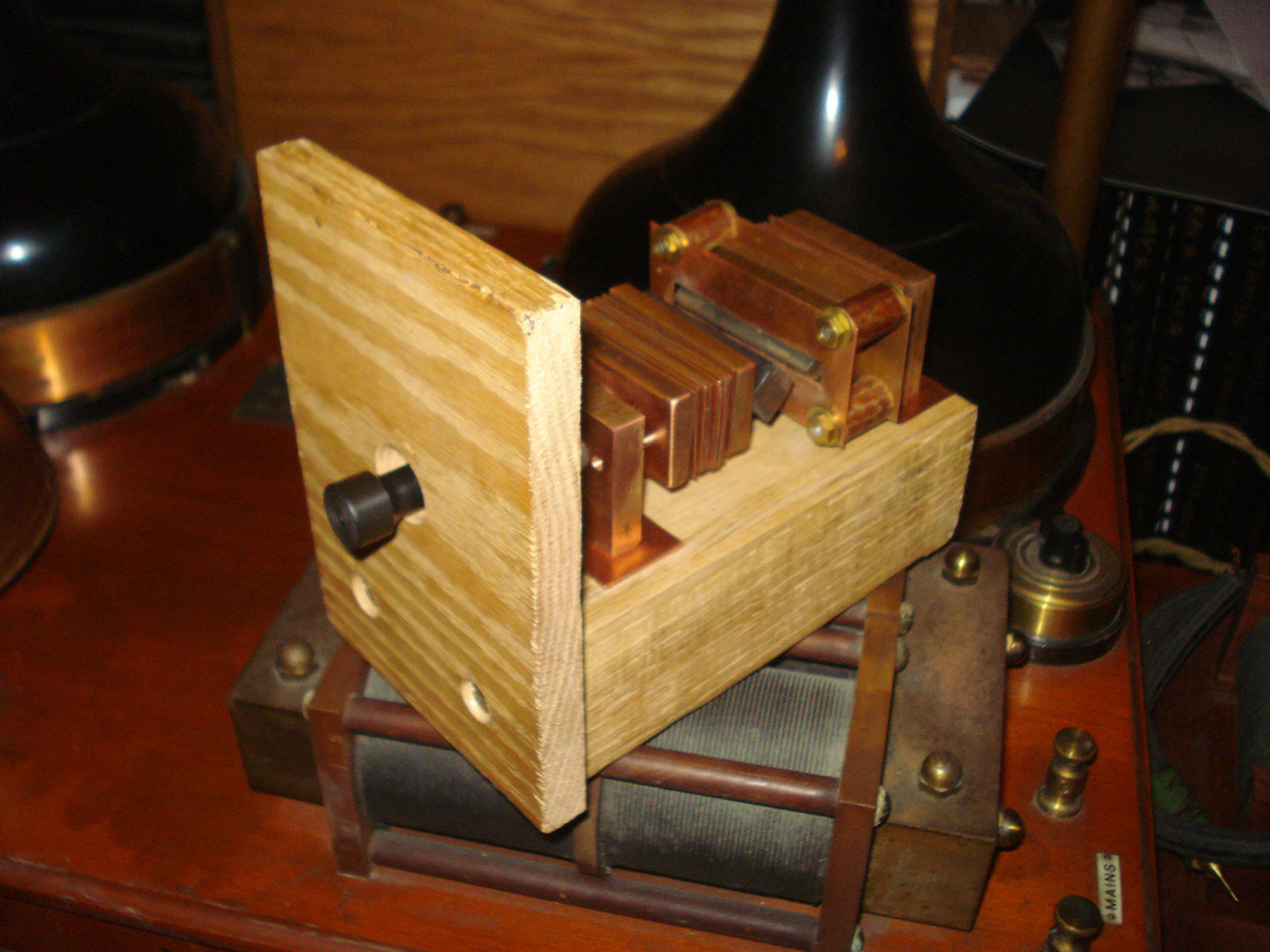
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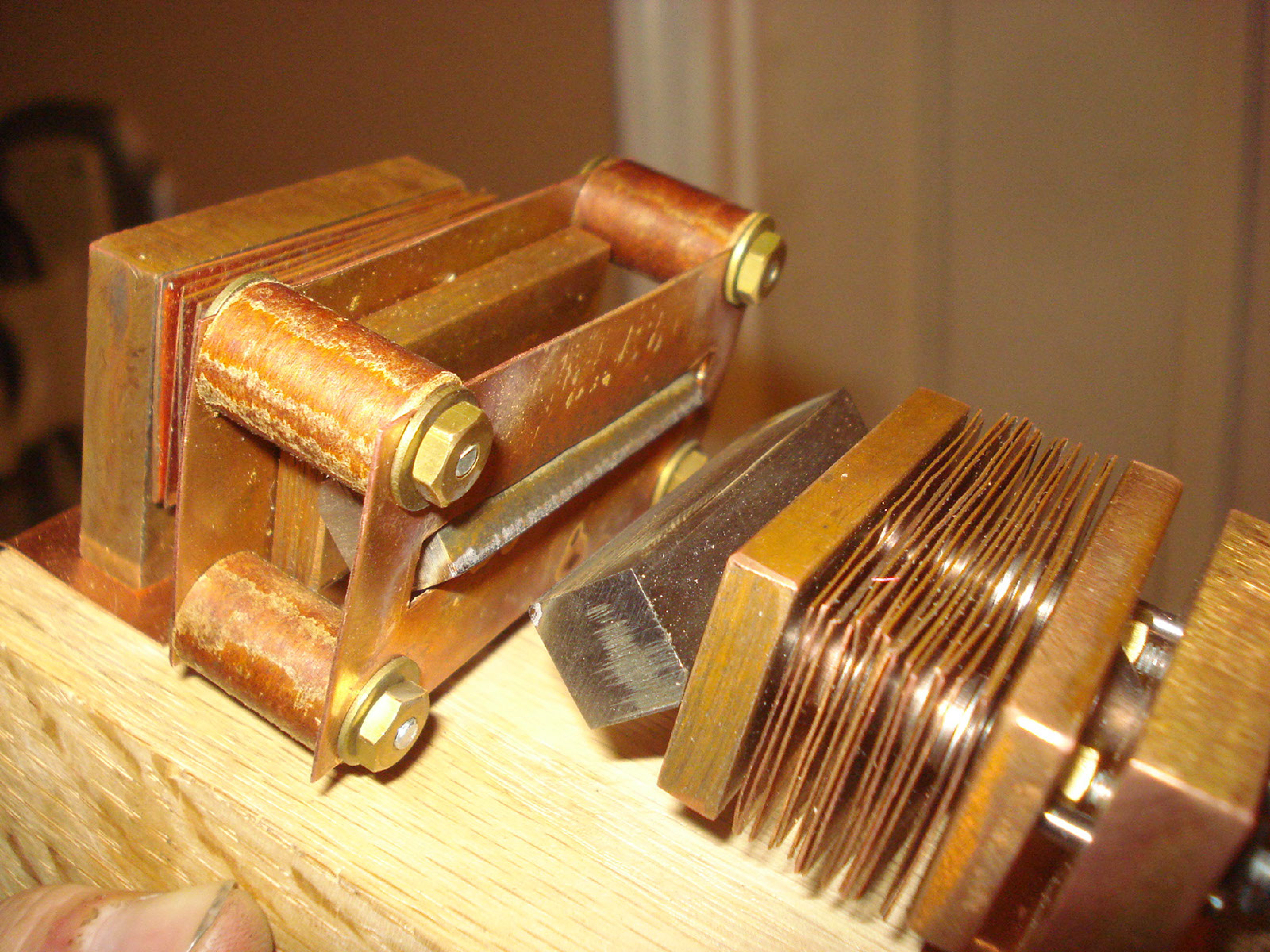

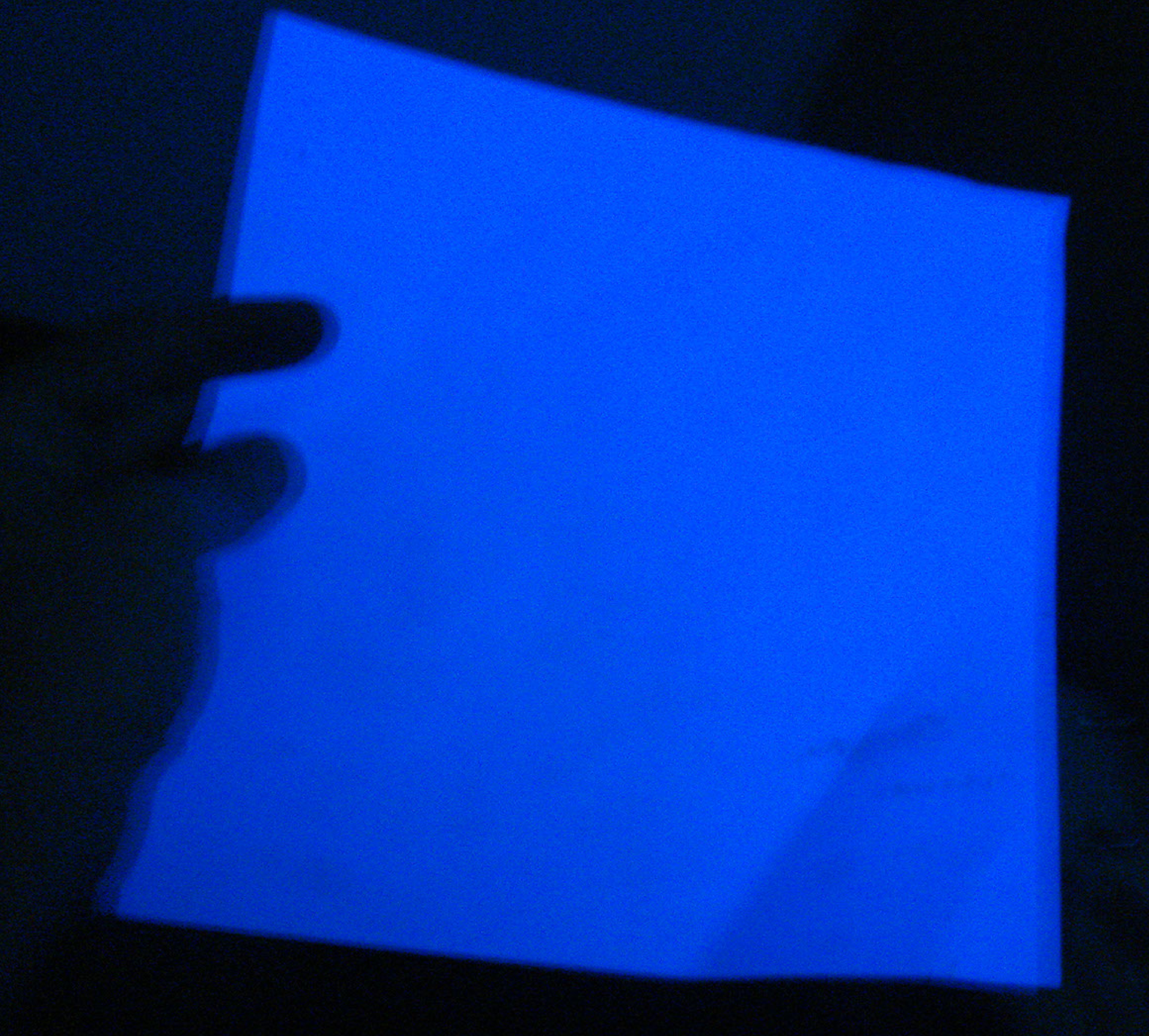

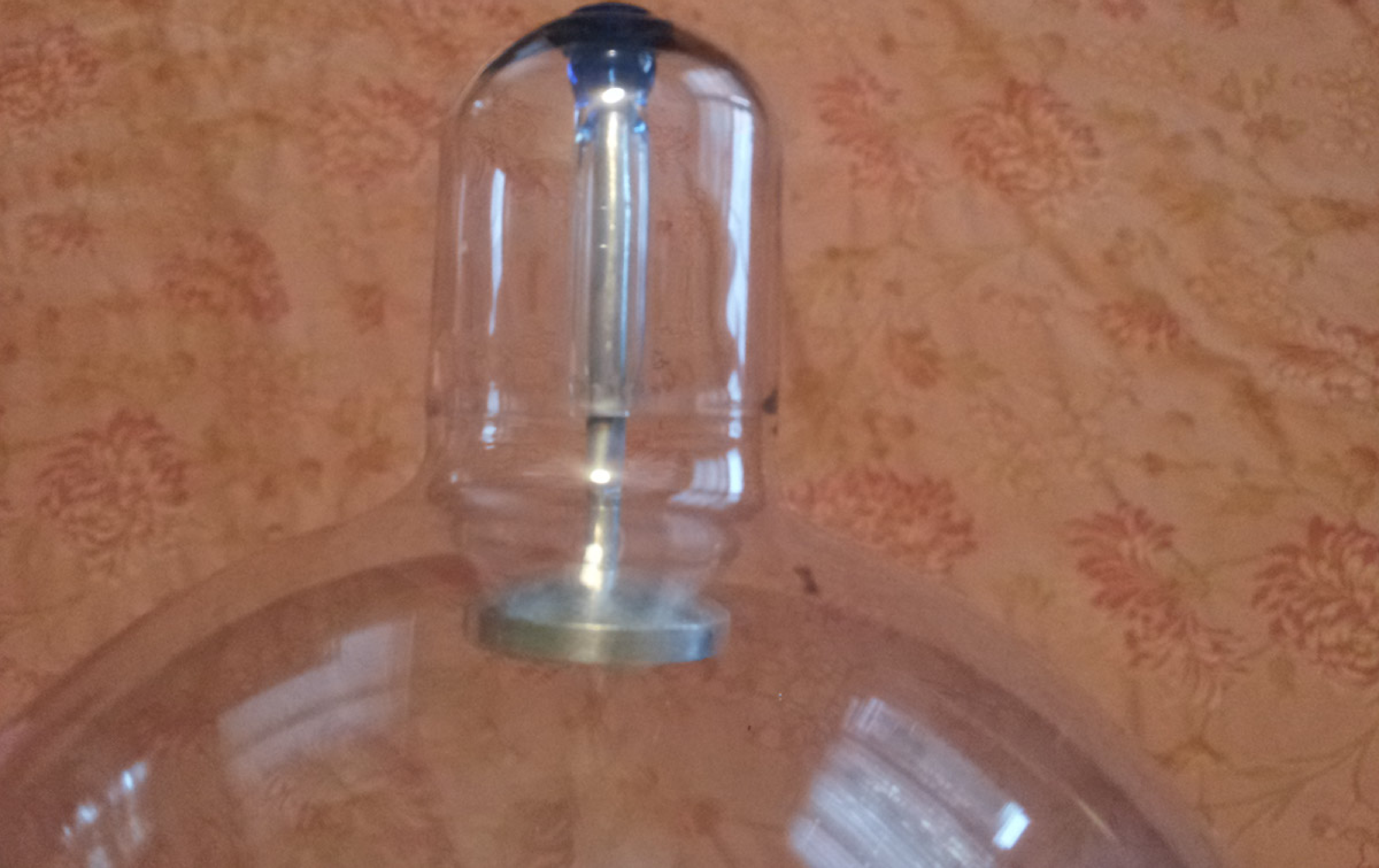

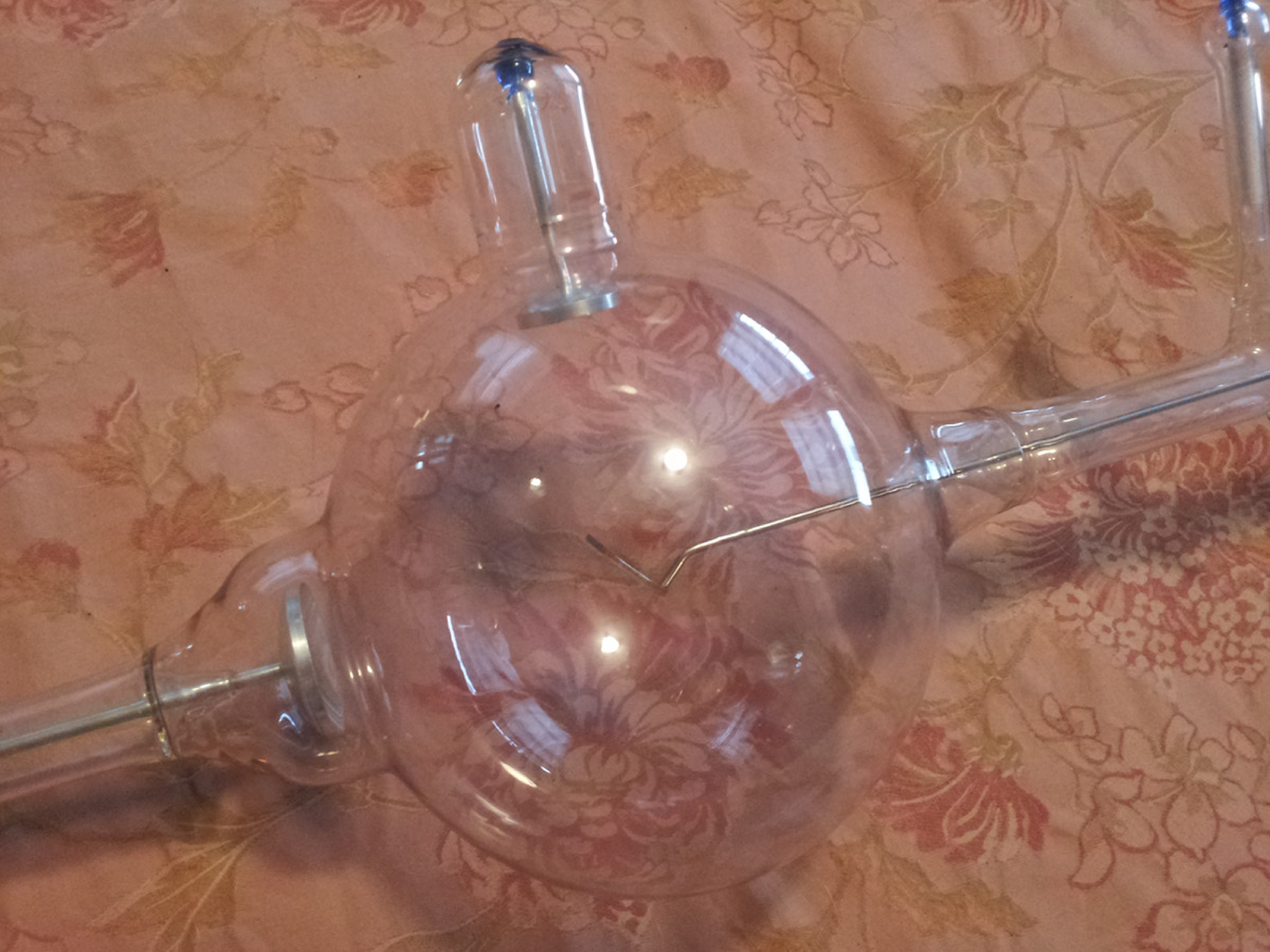

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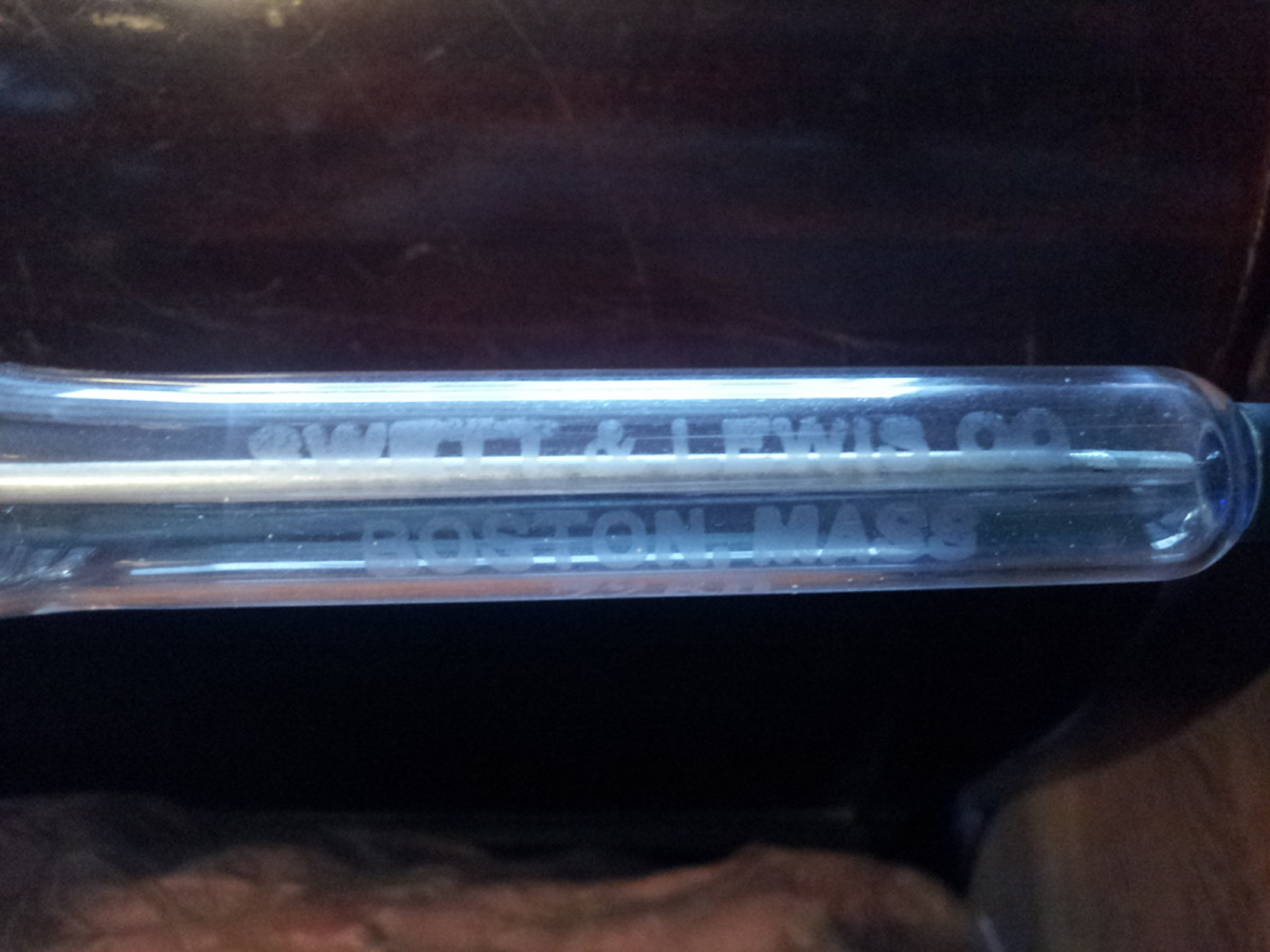
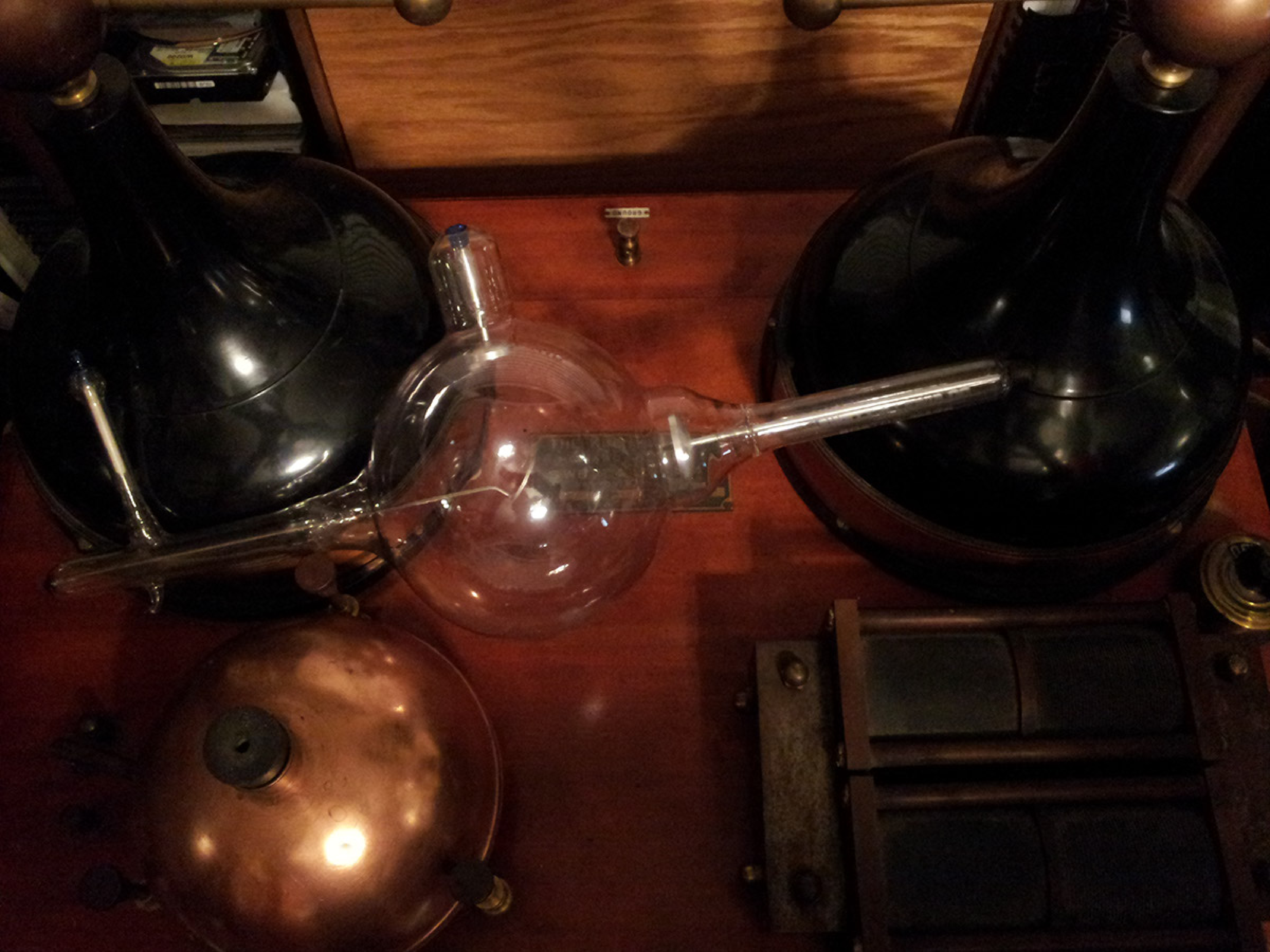
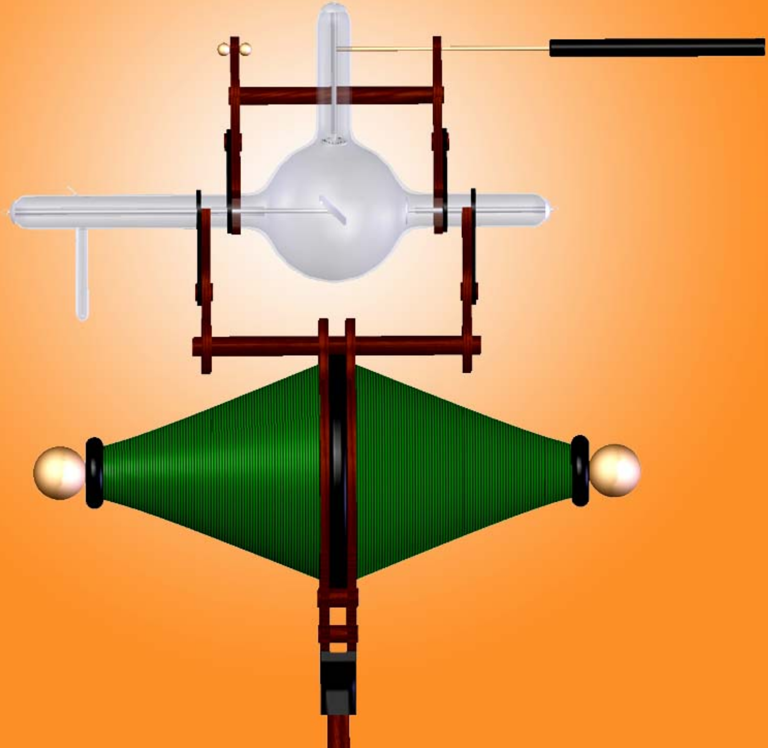
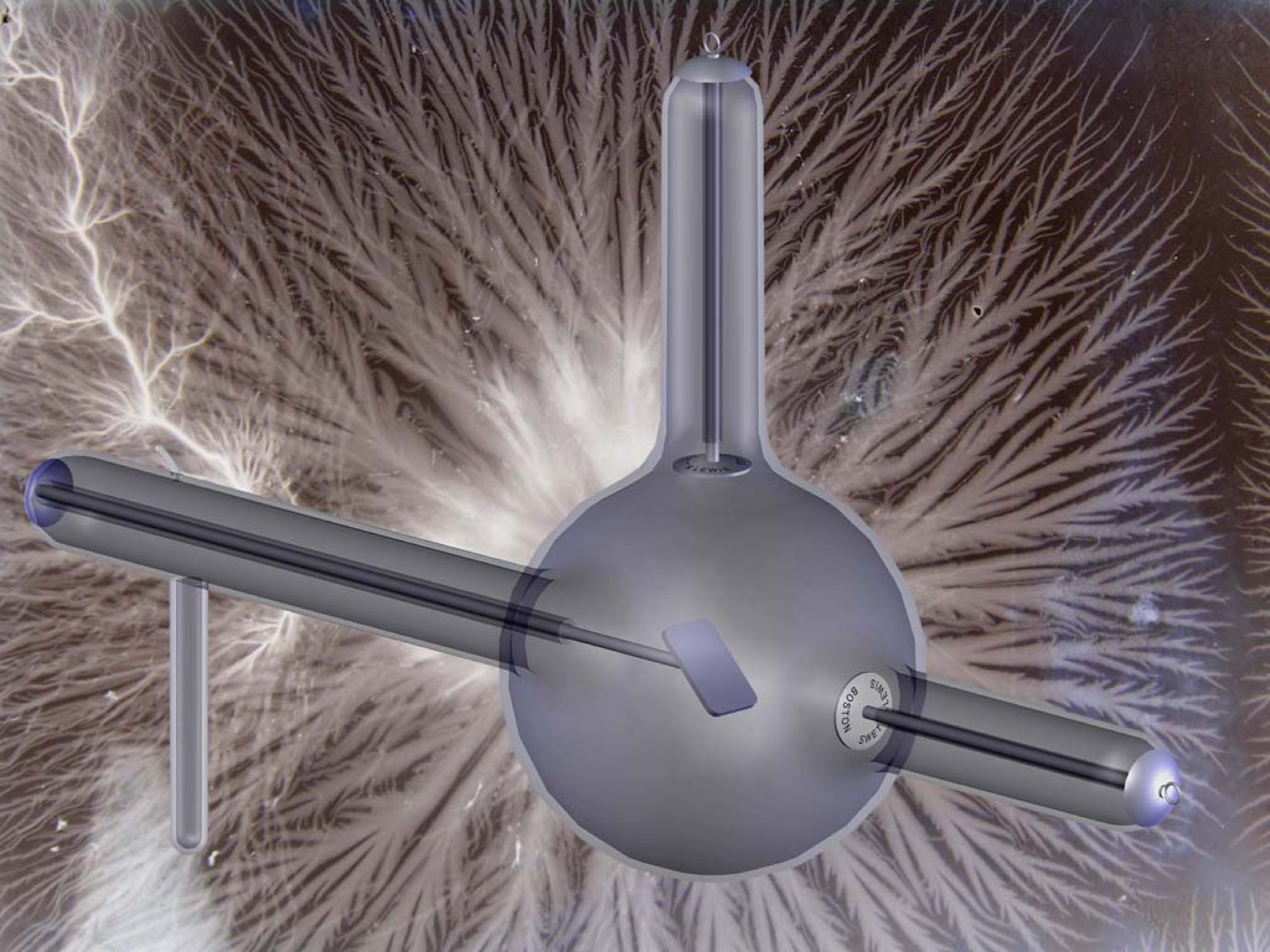


SWIFT & LEWIS CO
BOSTON, MASS



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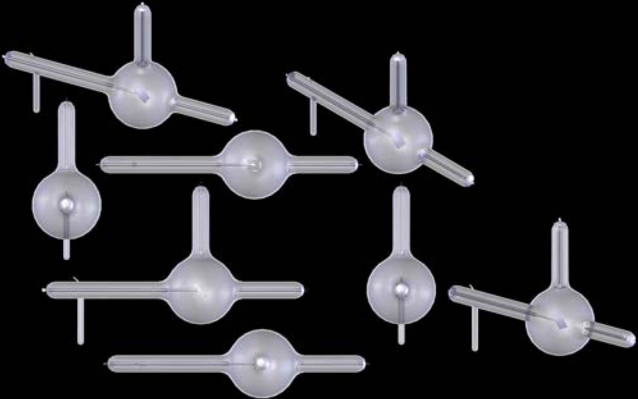
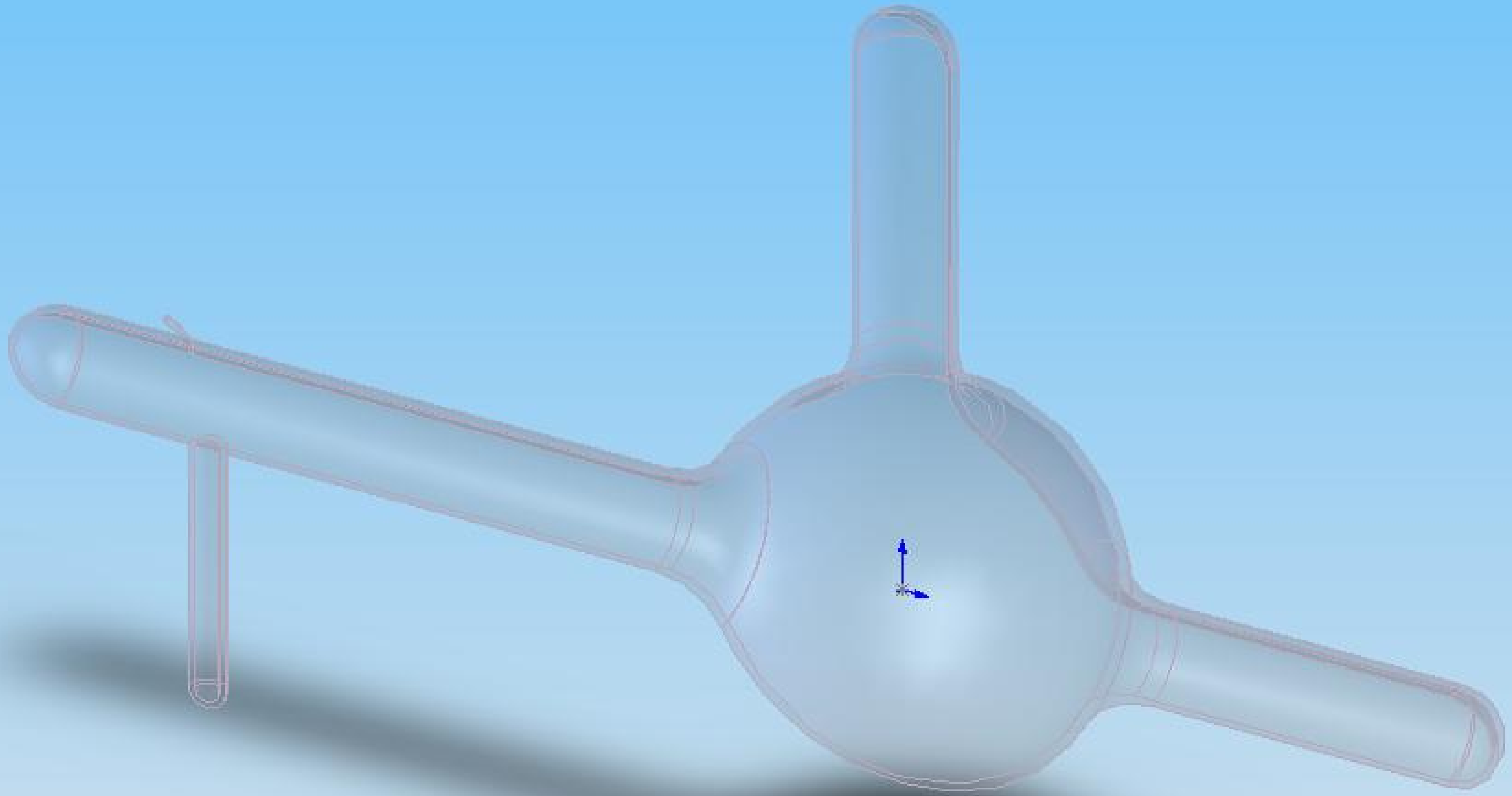
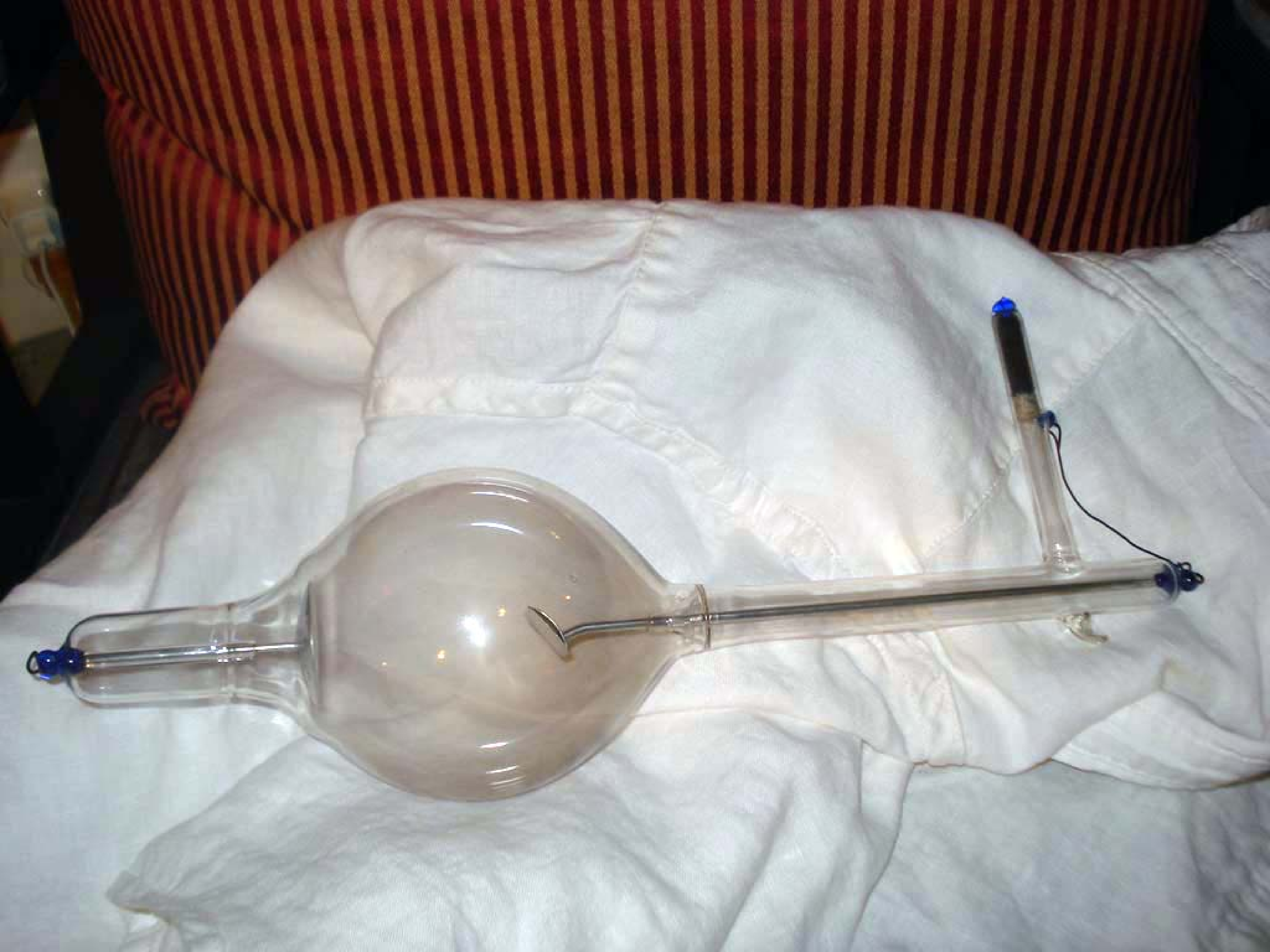


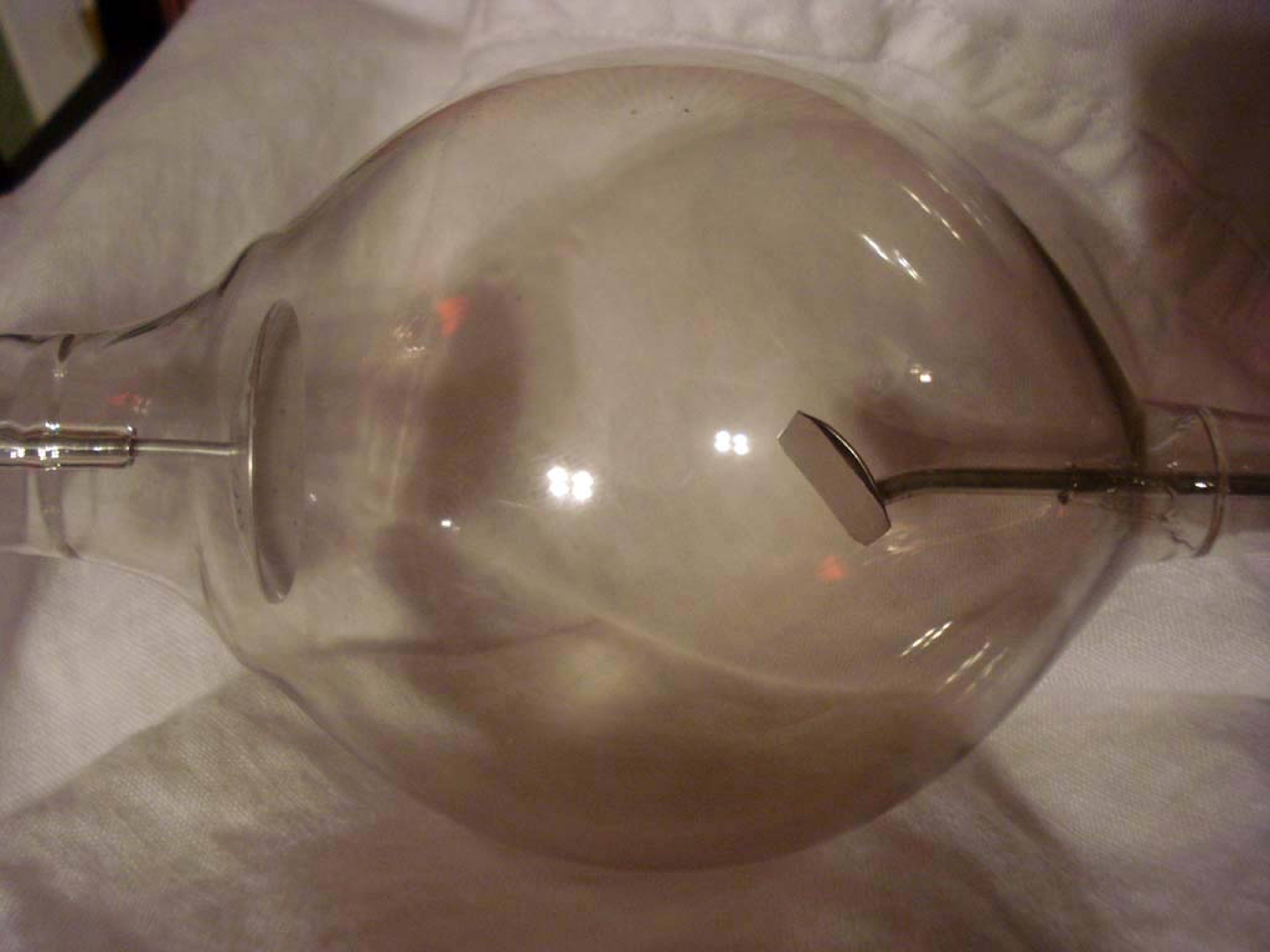
SWETT & LEWIS
COMPANY.
The Kinraide Coil
79 FRANKLIN ST.,
BOSTON.

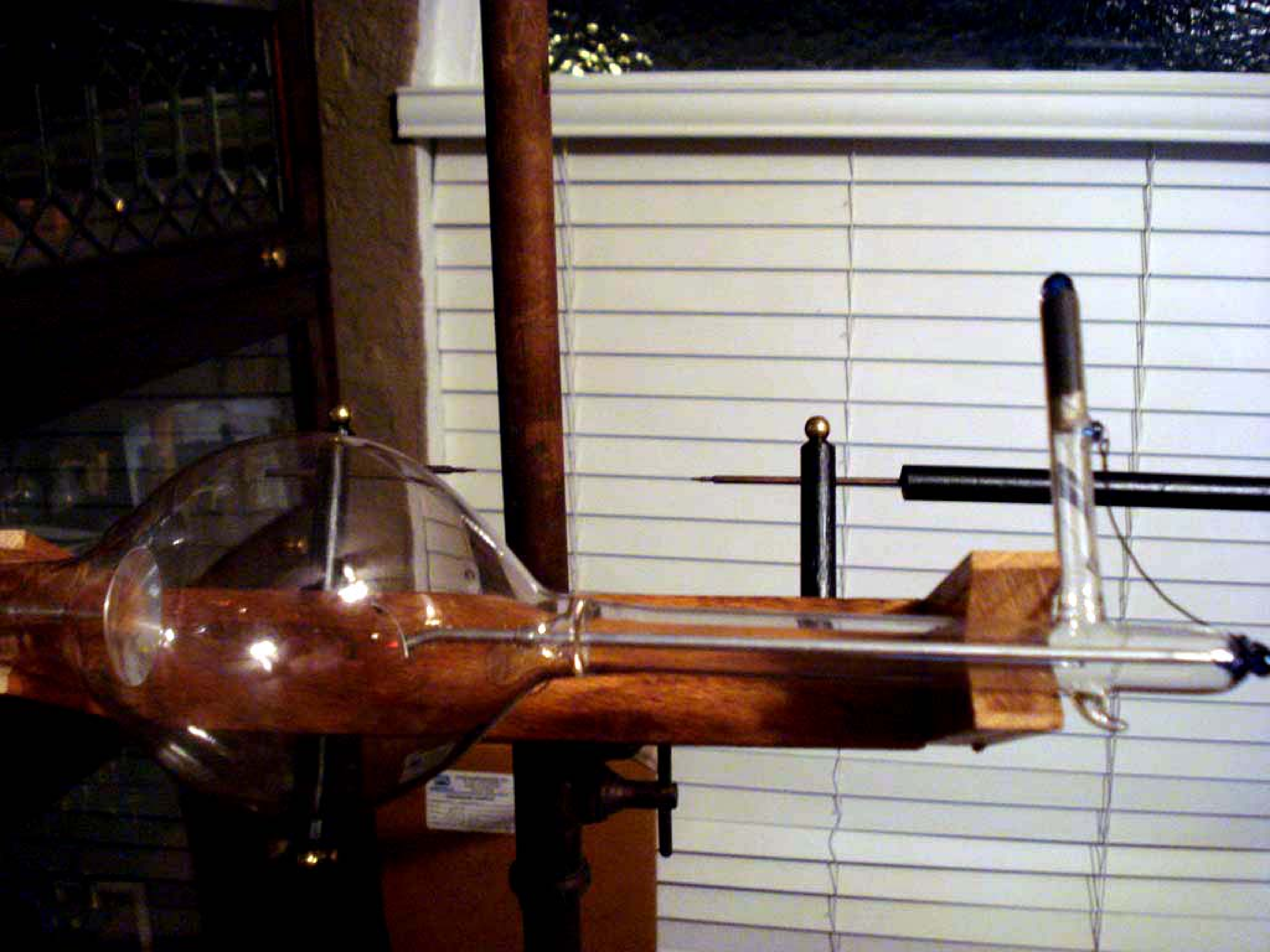
COILS
AND
X-RAY TUBES
SWETT & LEWIS COMPANY
BOSTON MASSACHUSETTS

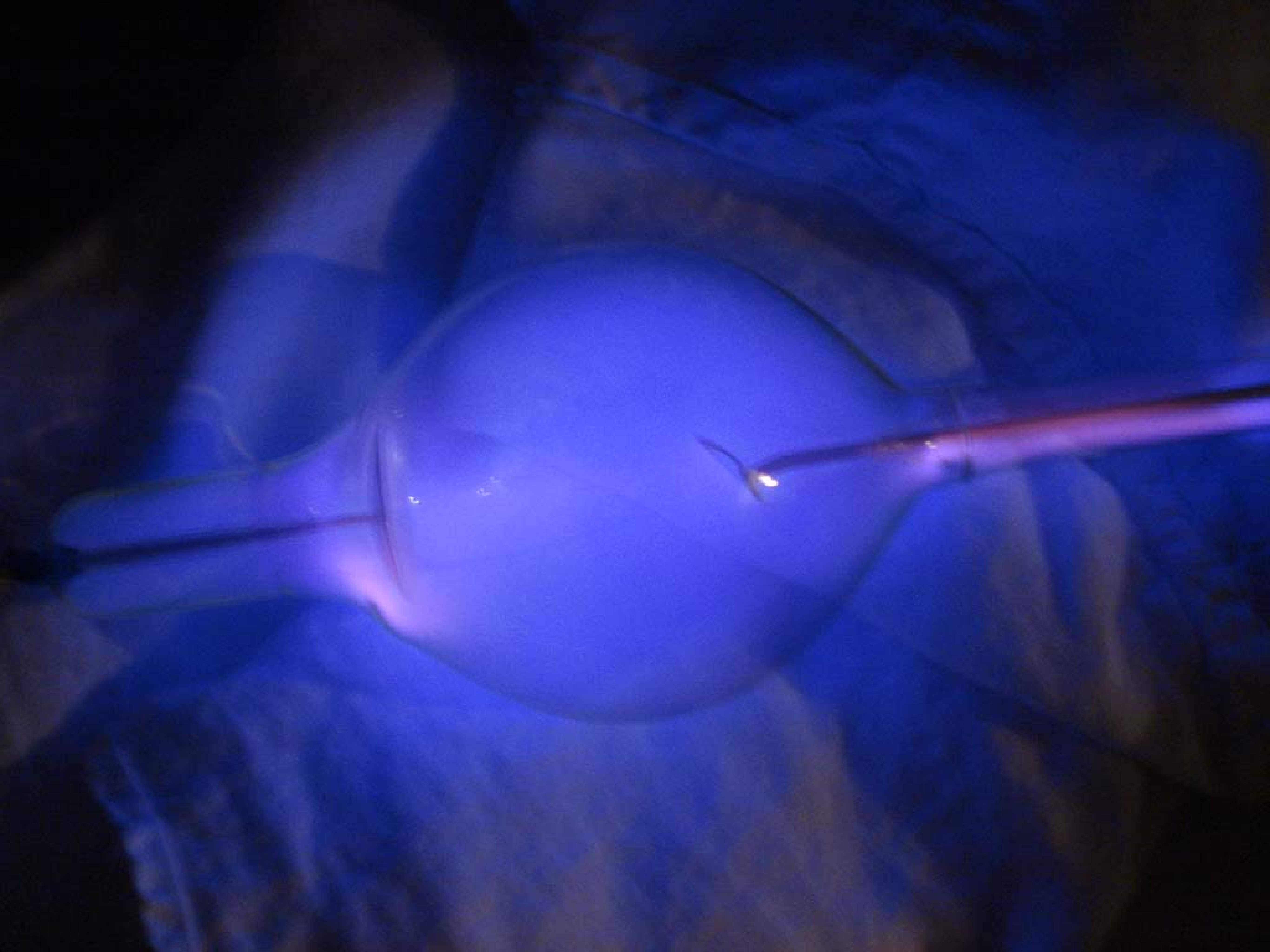
SWETT & LEWIS
BOSTON

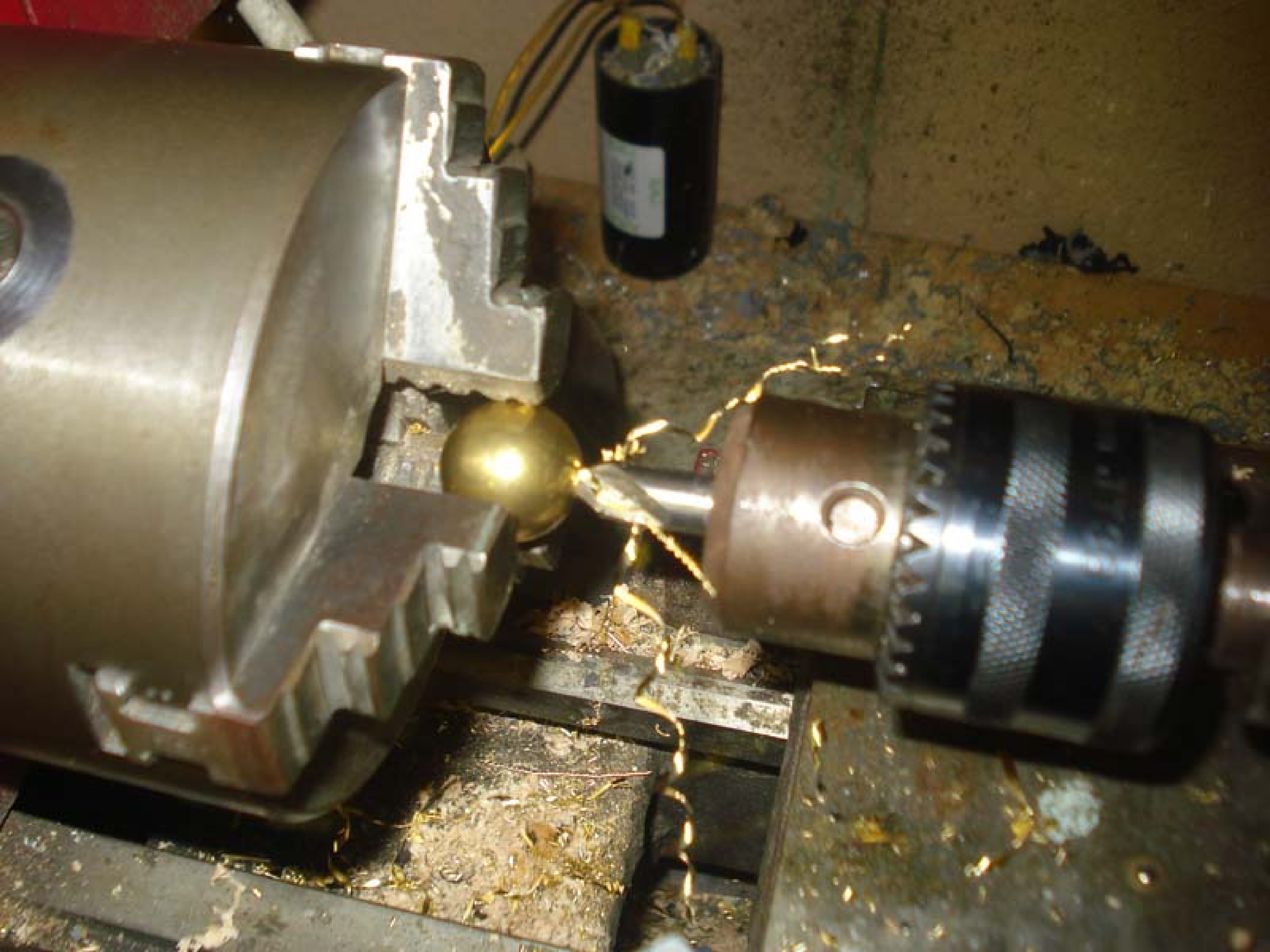


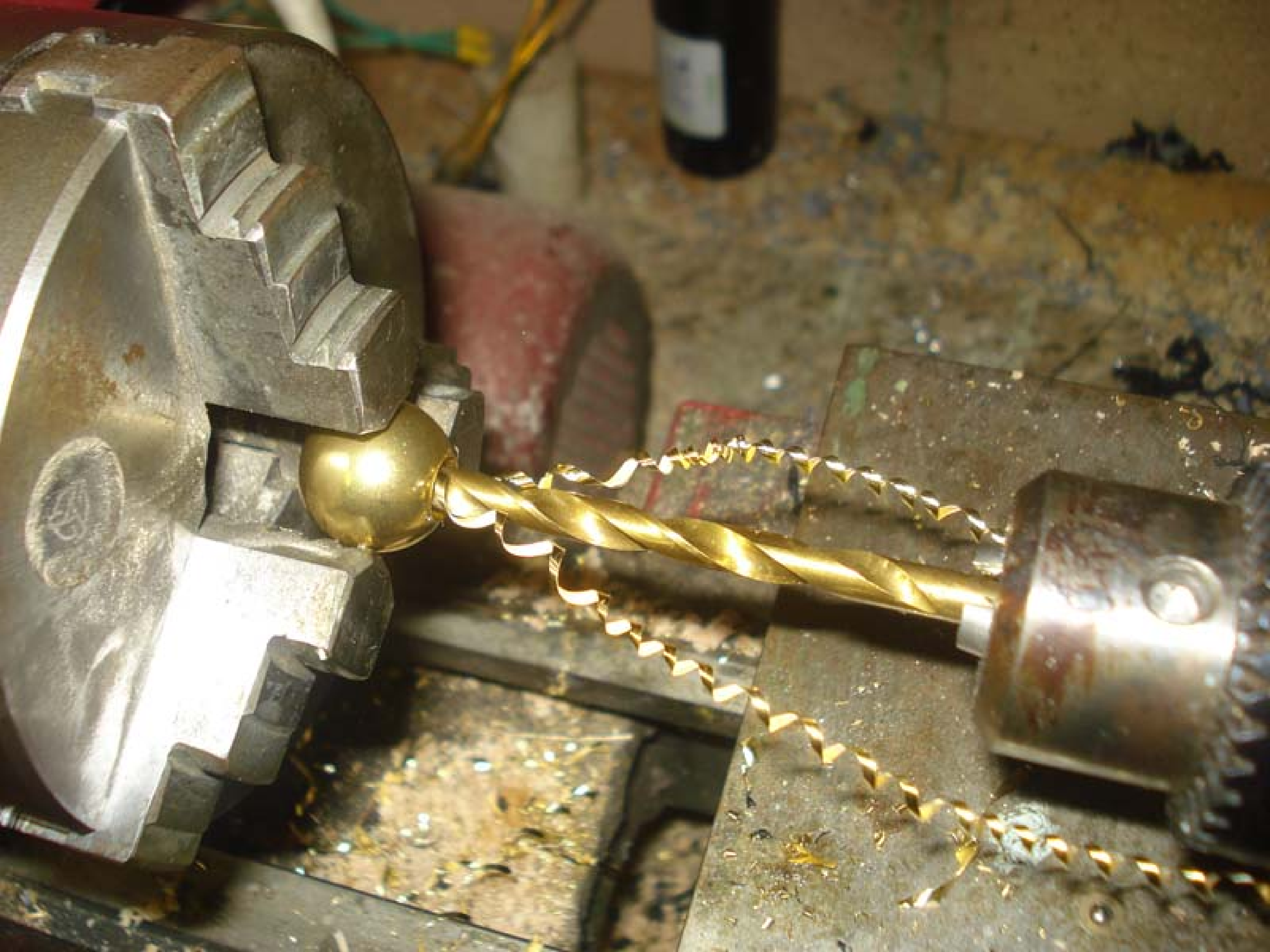


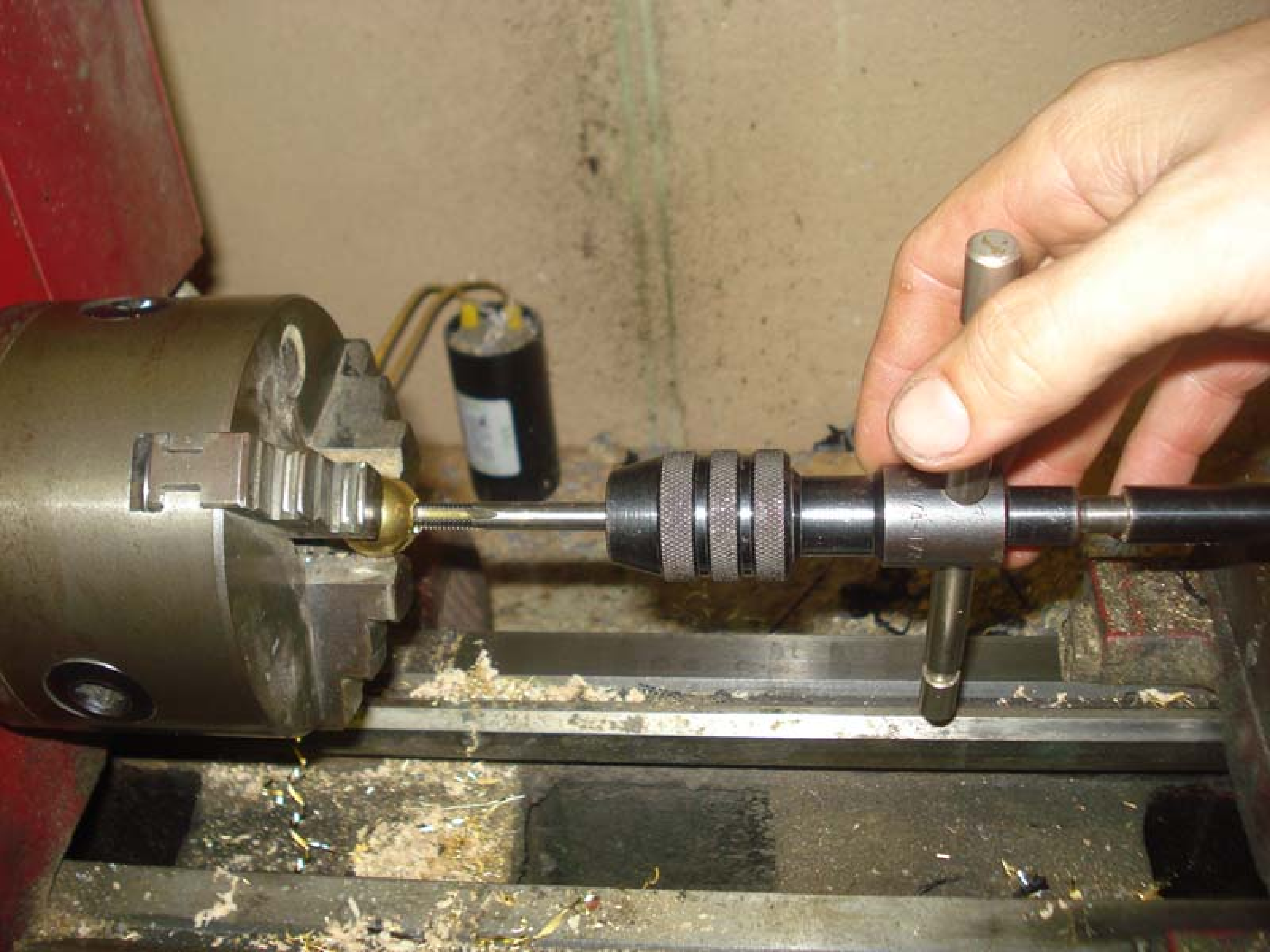


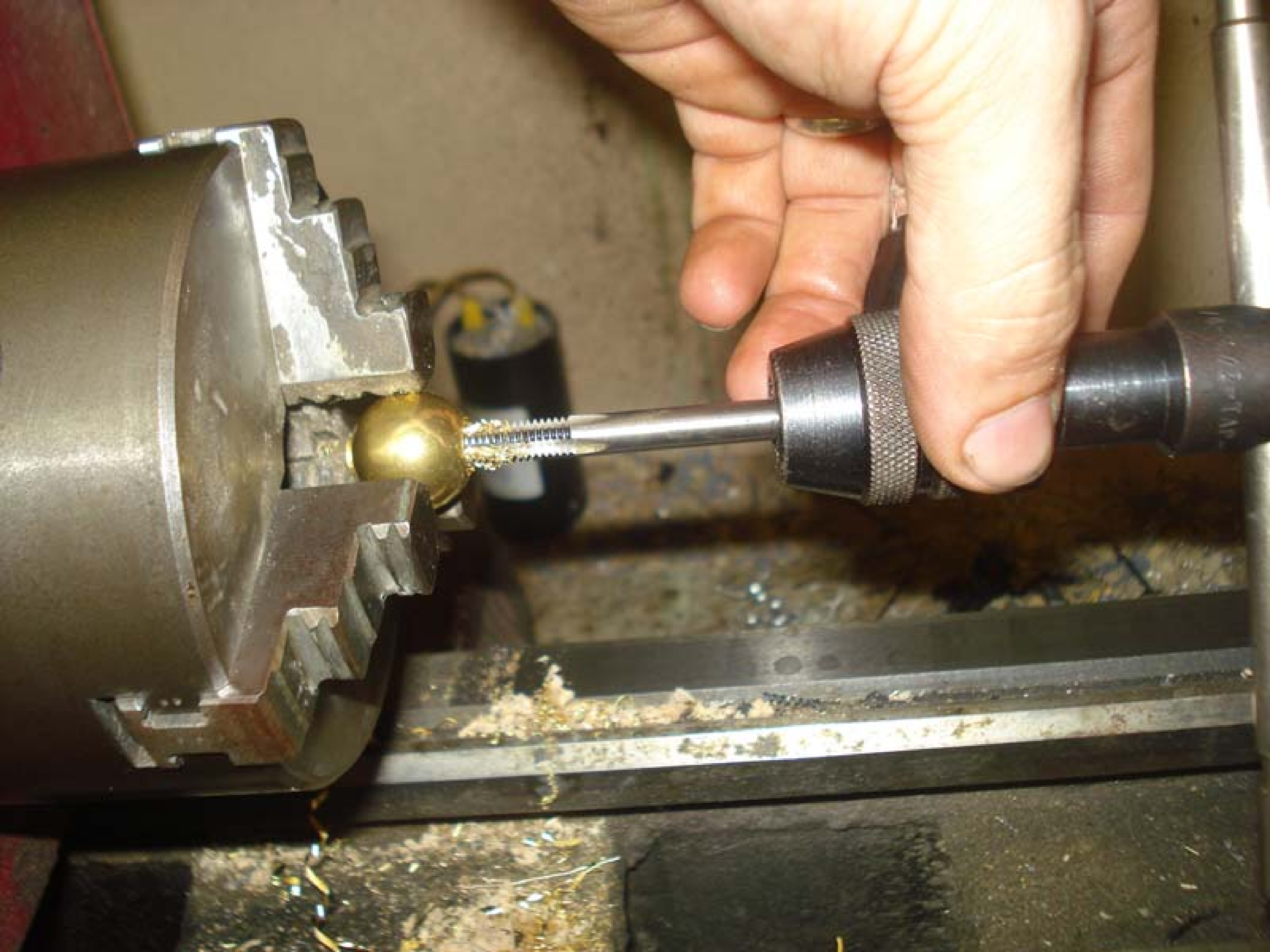


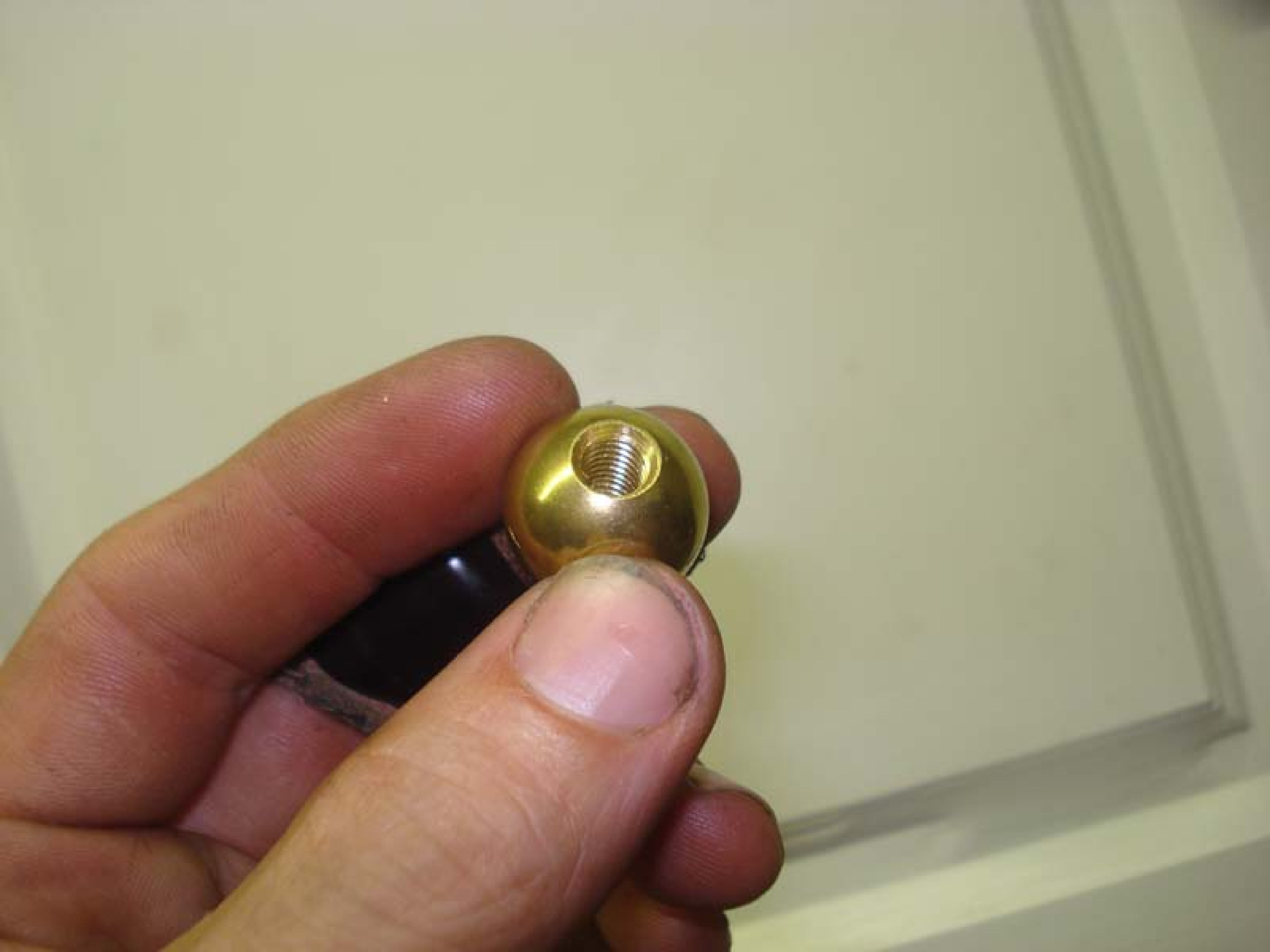


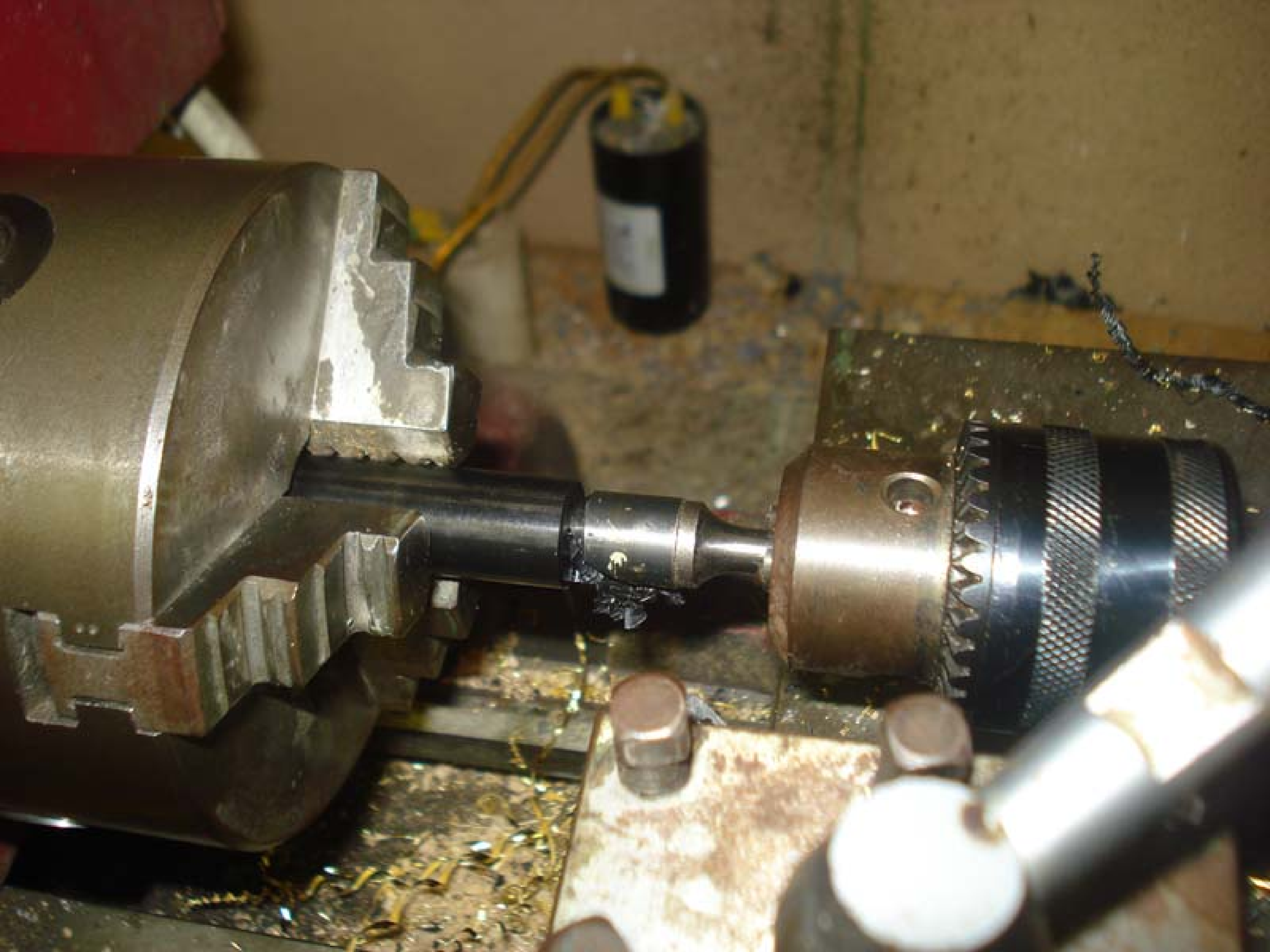


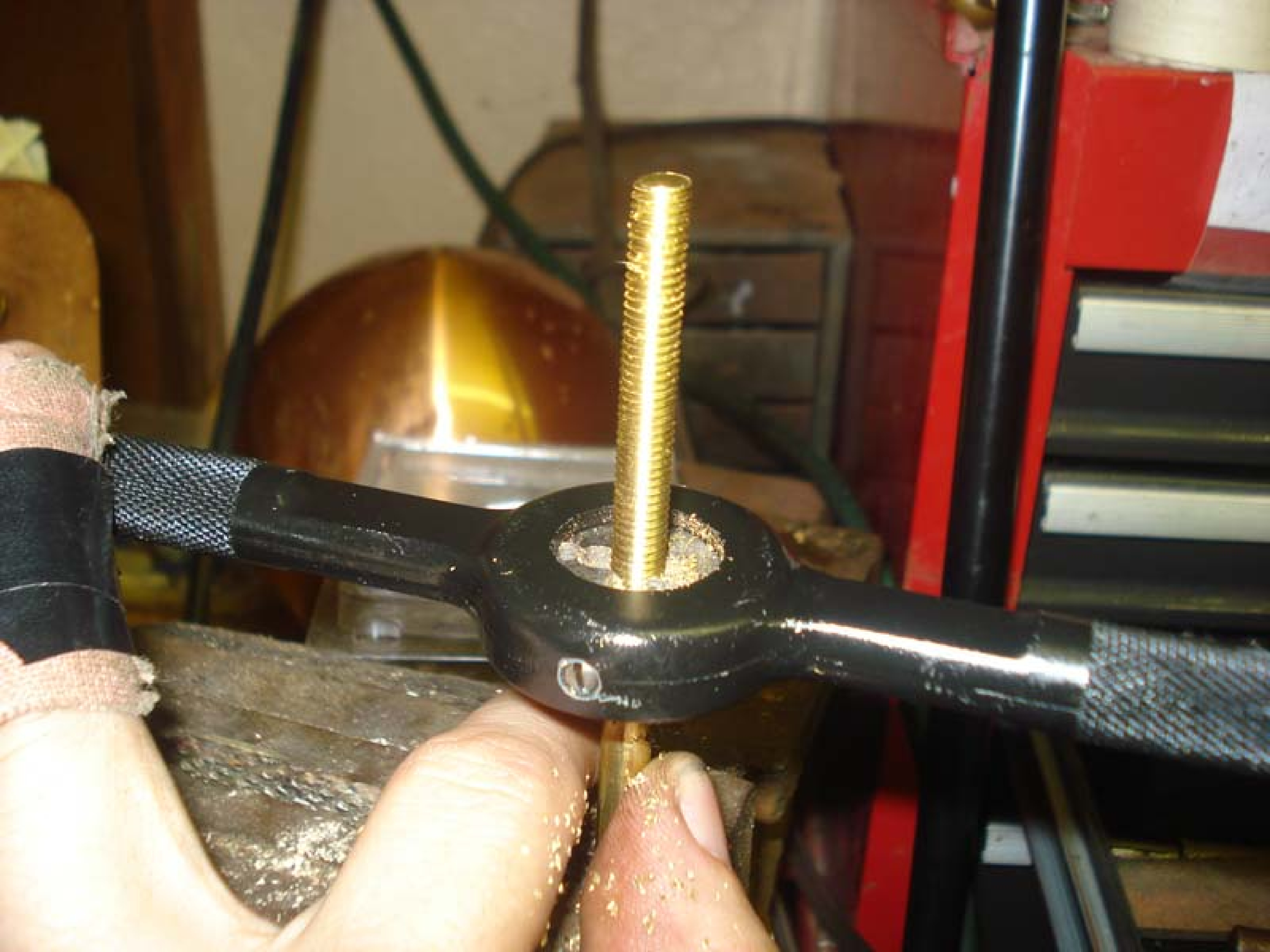


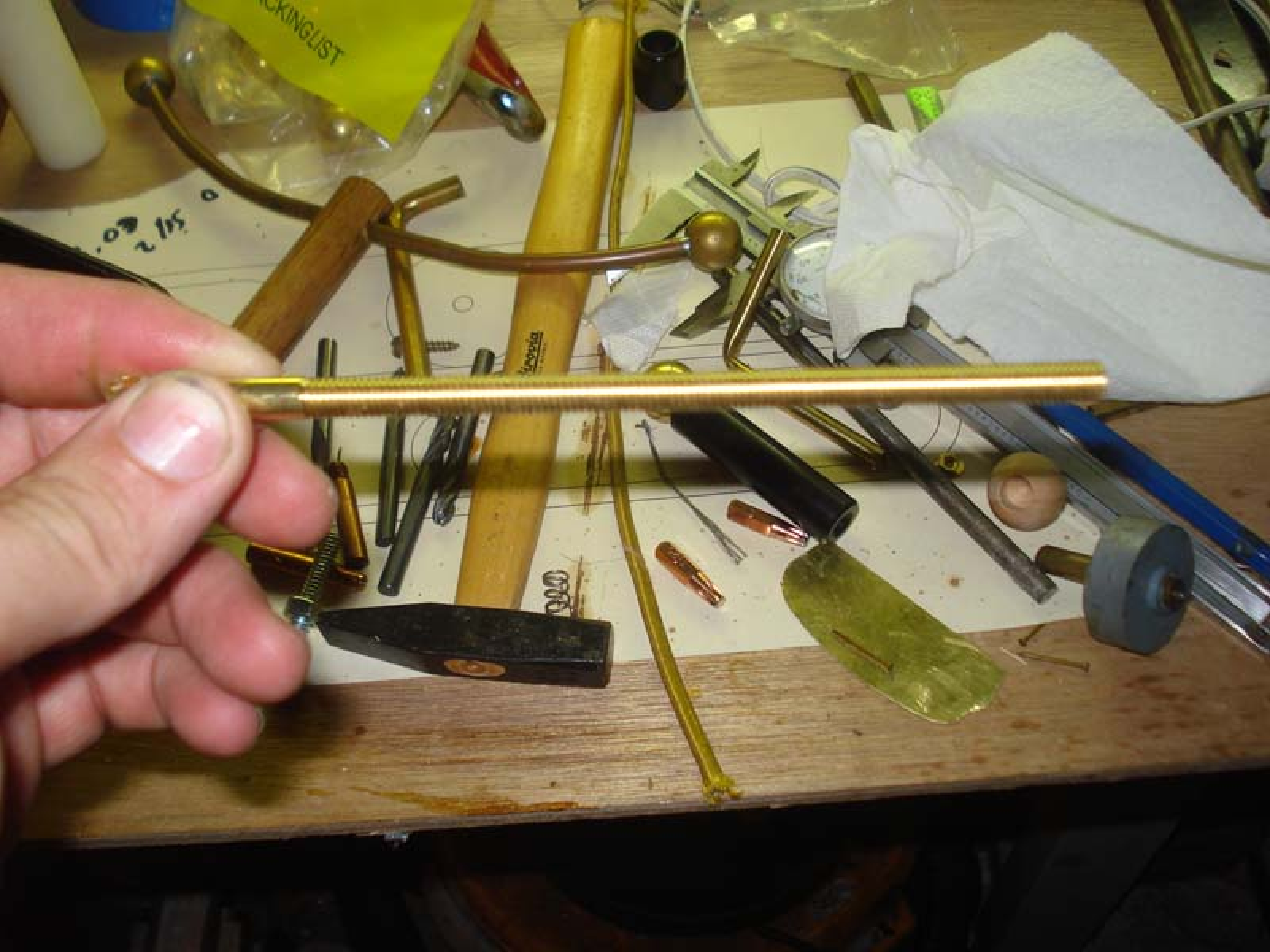








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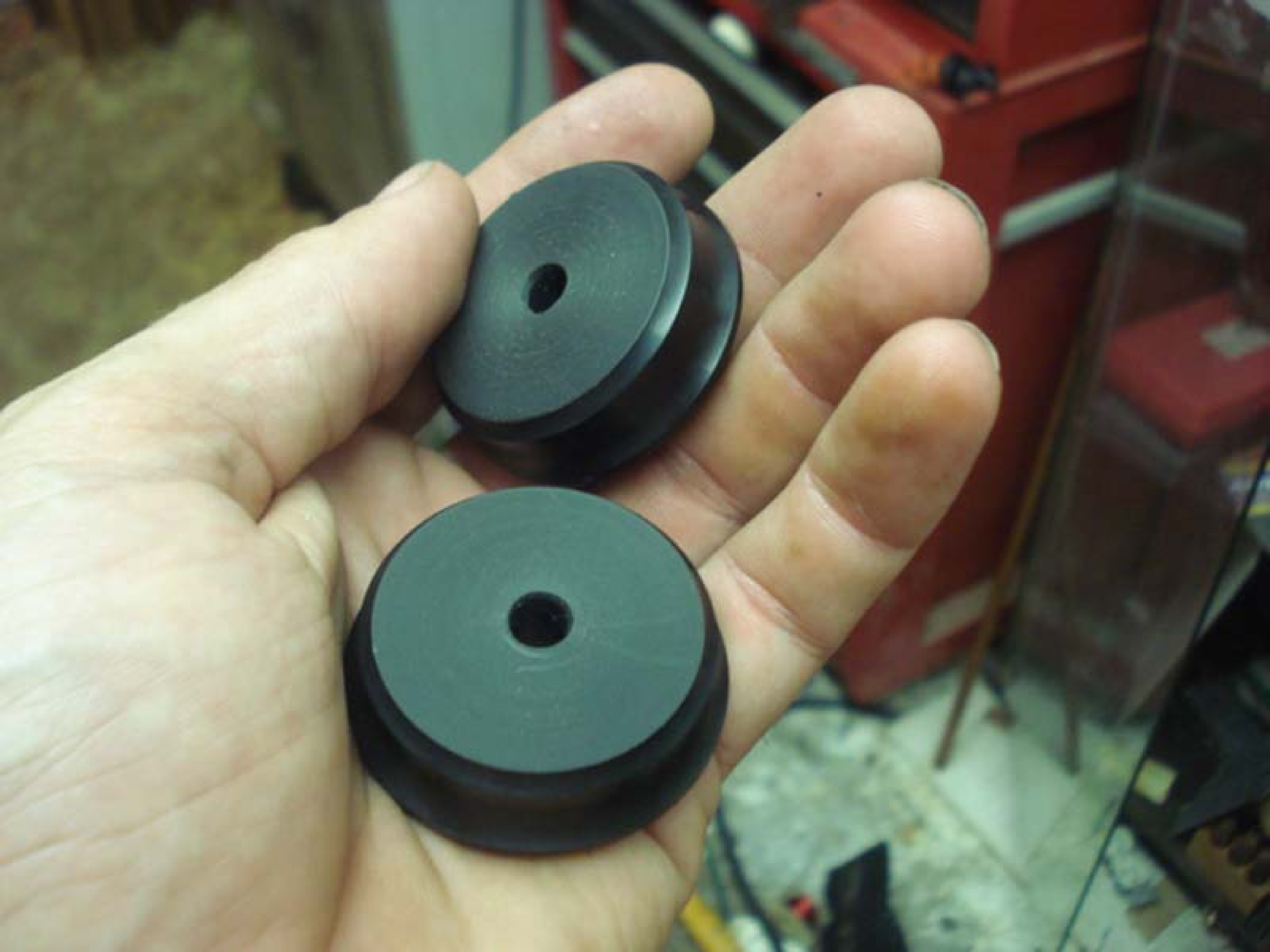
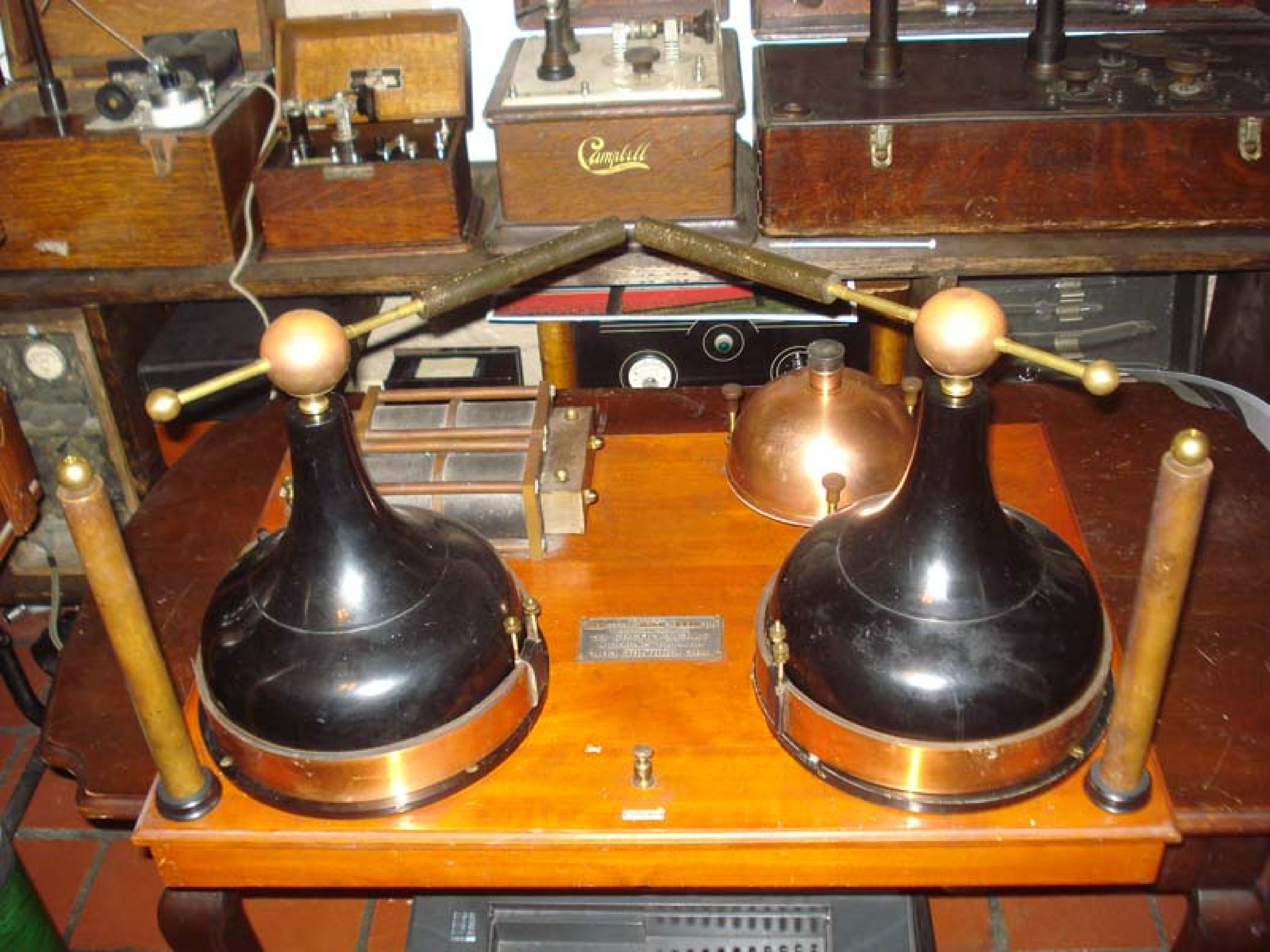
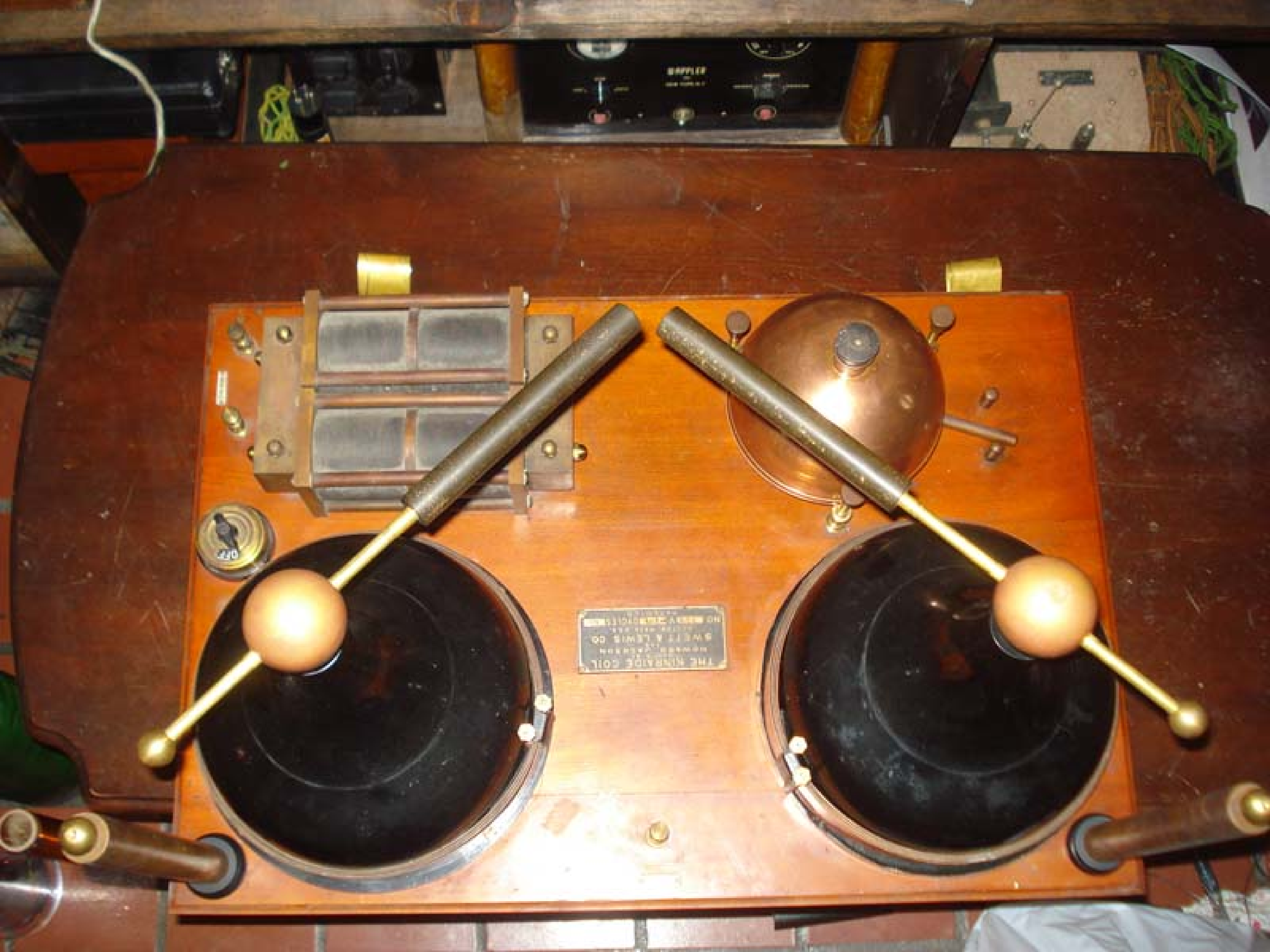
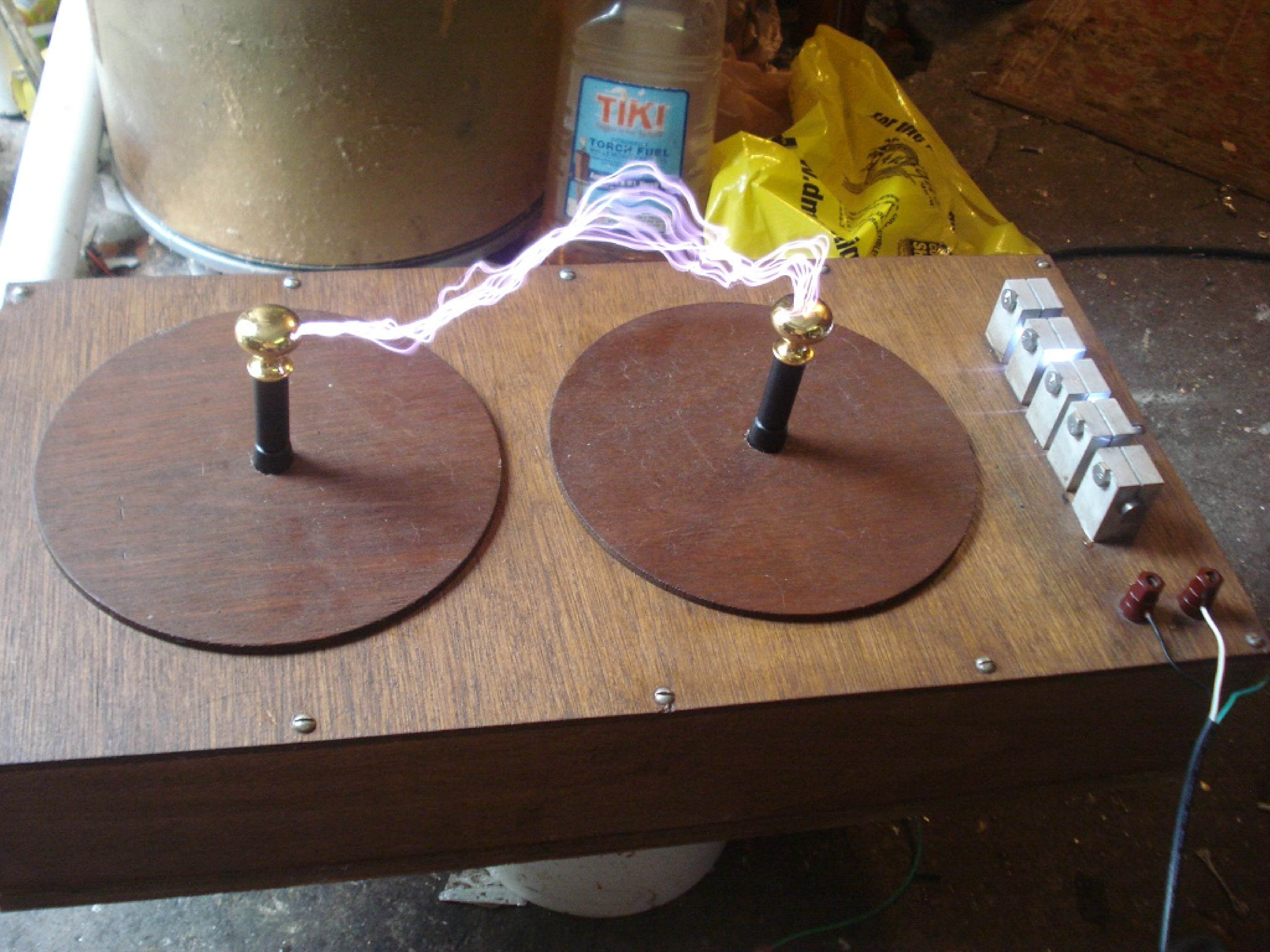



Campbell


WAPPLER
OFF
THE KINRAIDE COIL
SWETT & LEWIS CO

LeDonne Brothers' Honey Farm
100% Pure Honey


TIKI
TORCH FUEL

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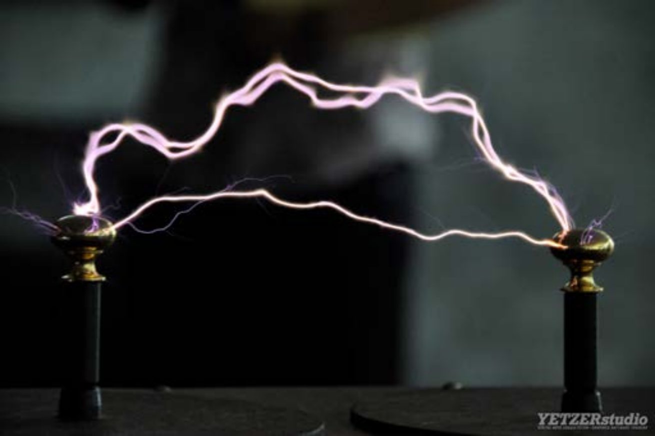
TORCH FUEL

YETZERstudio



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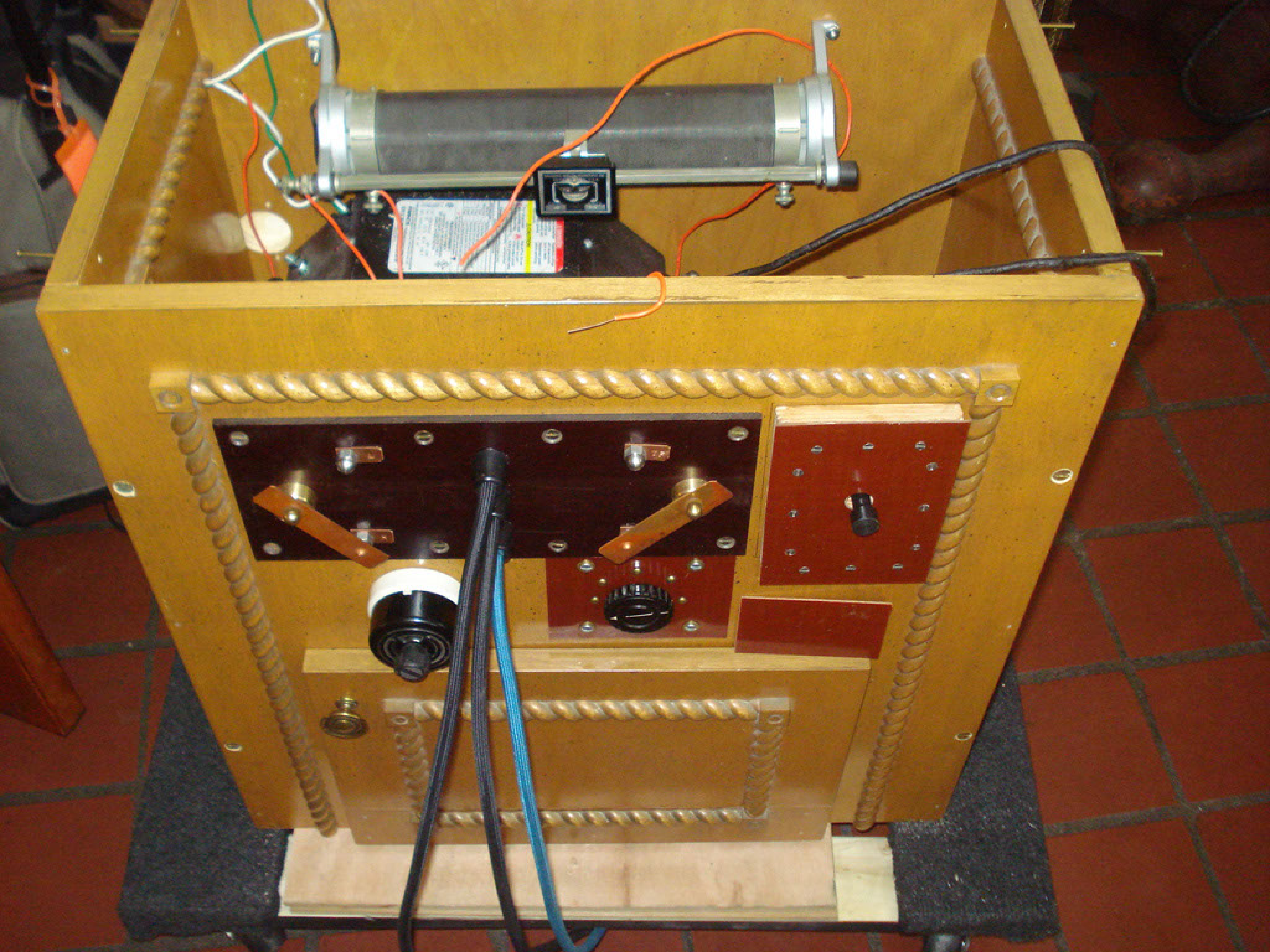

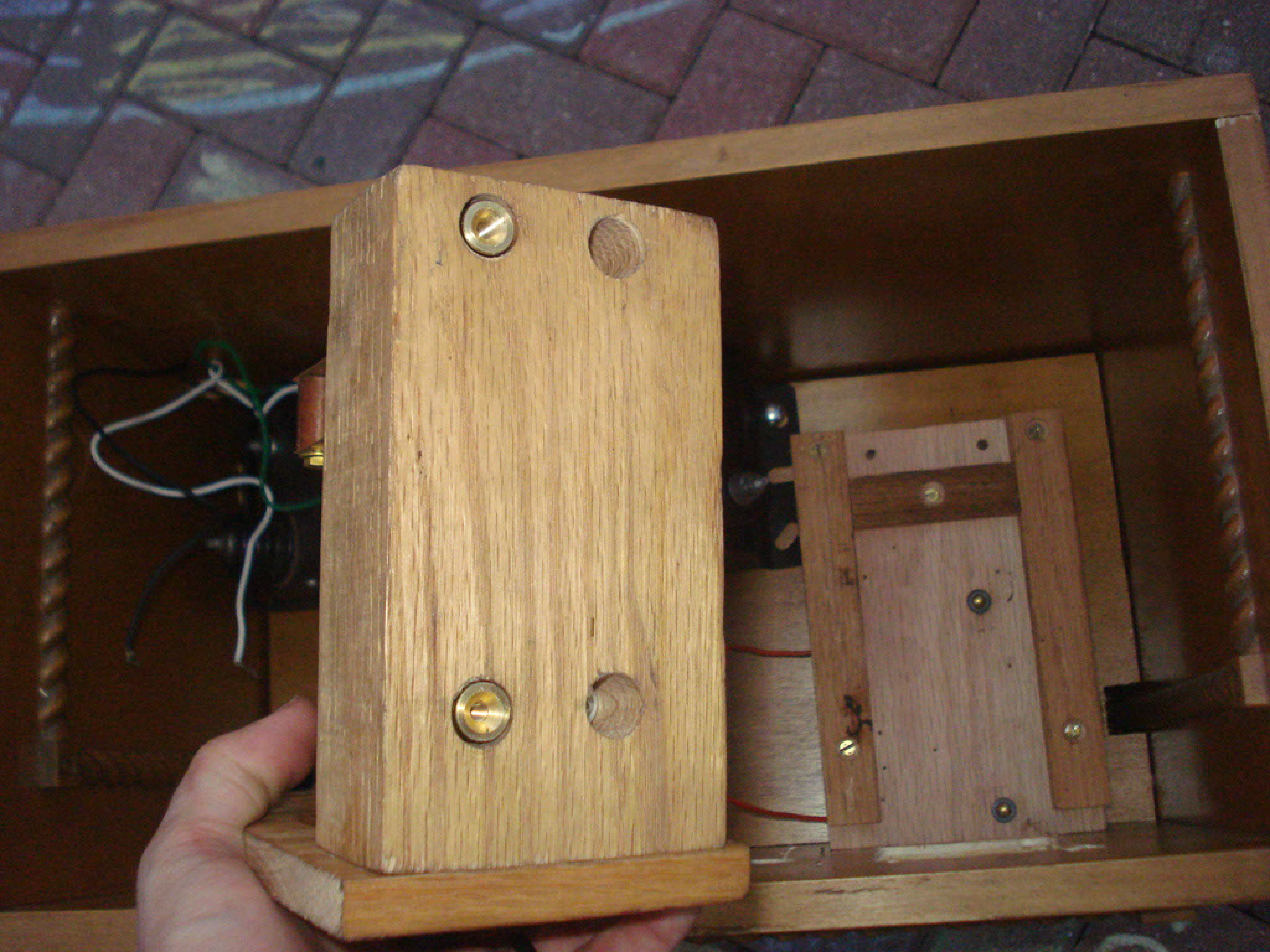

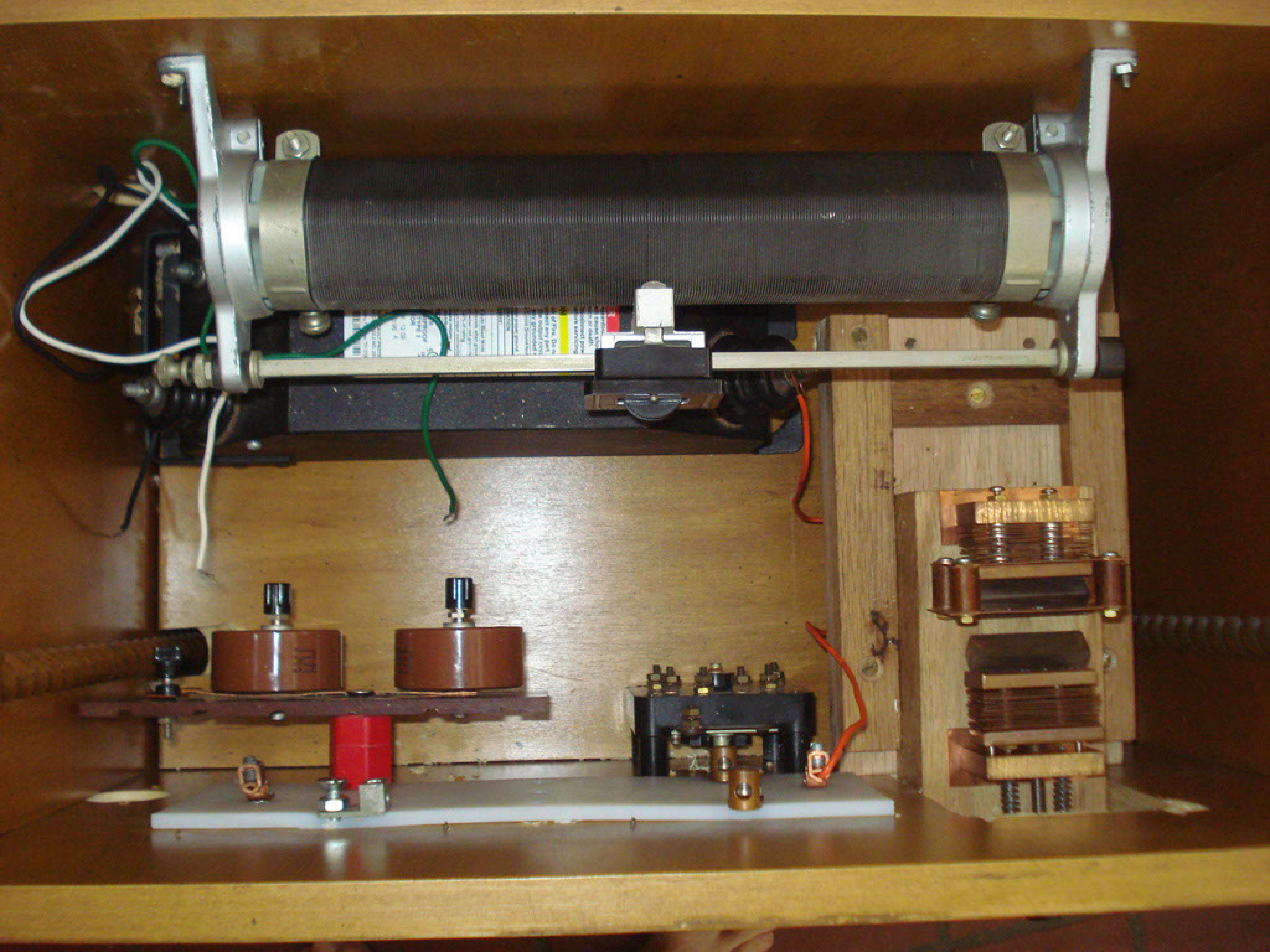

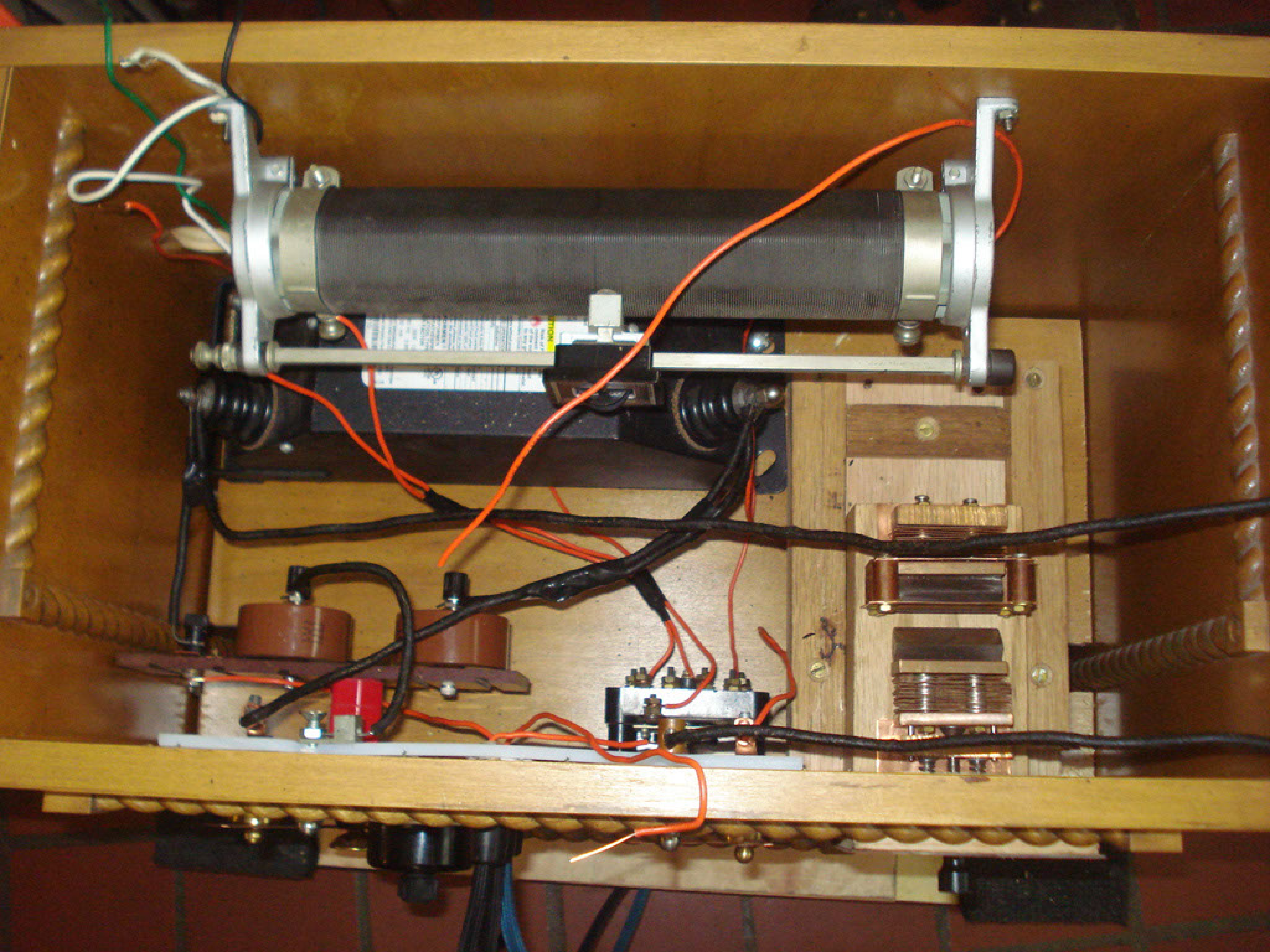

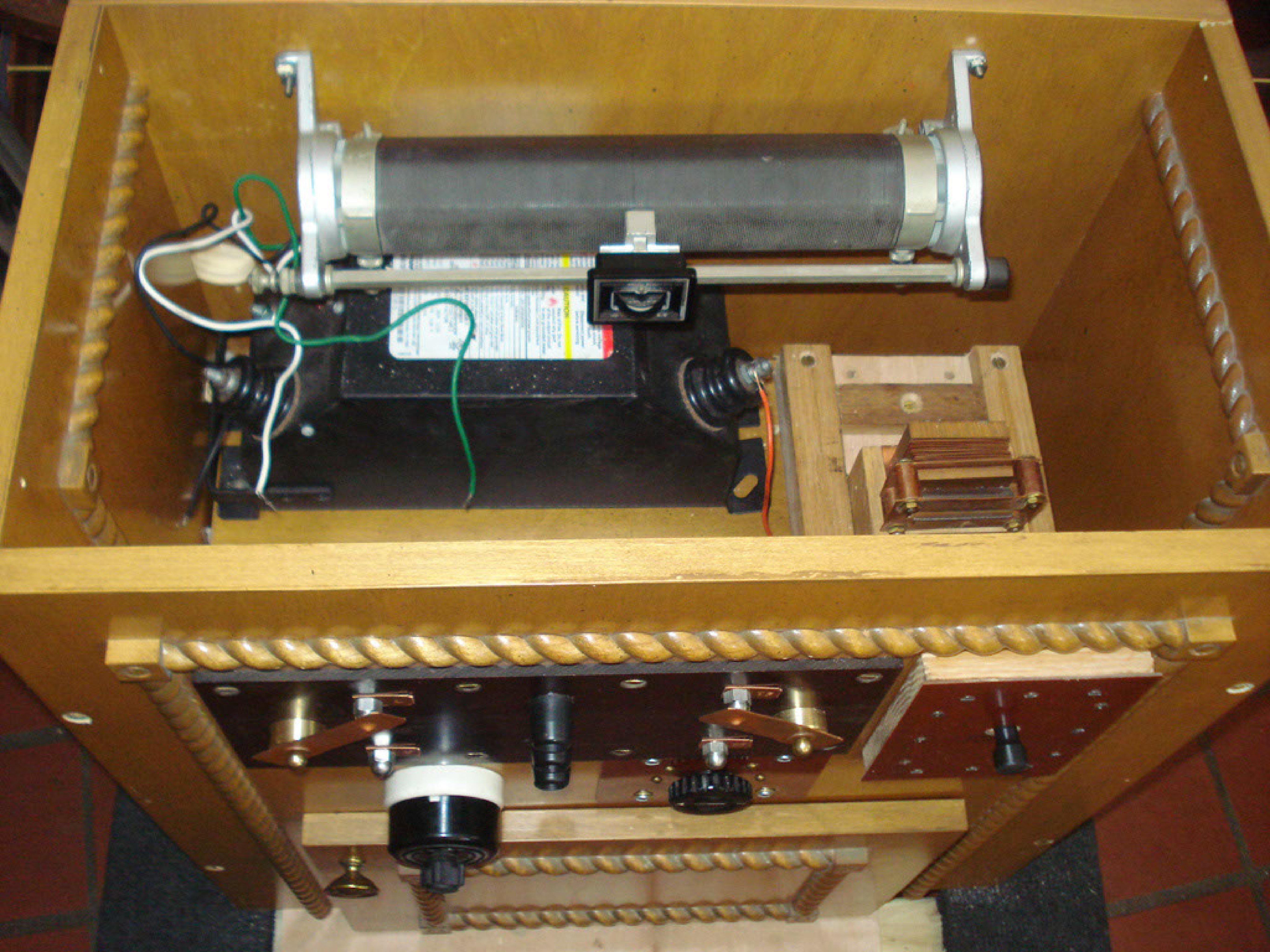

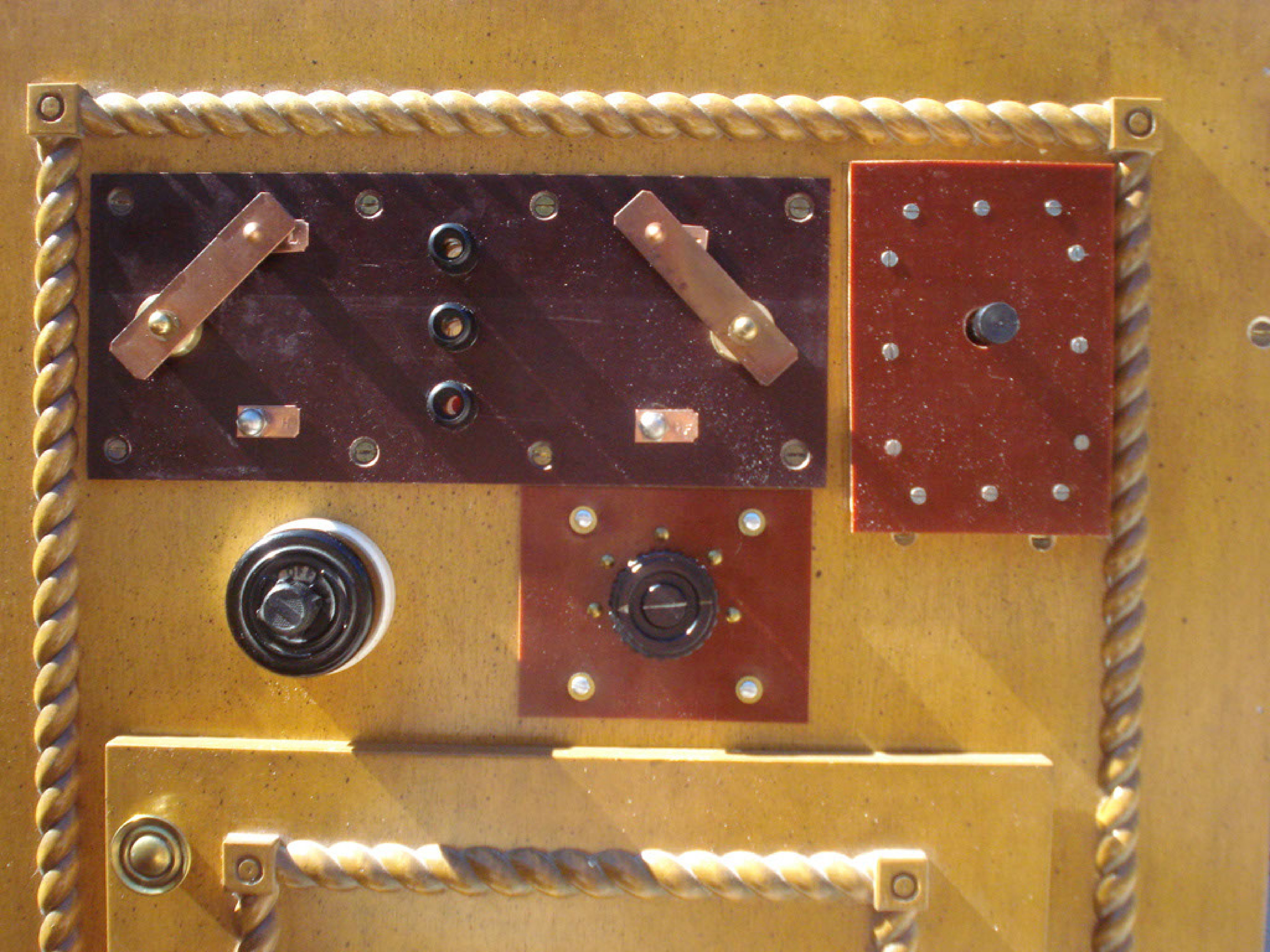

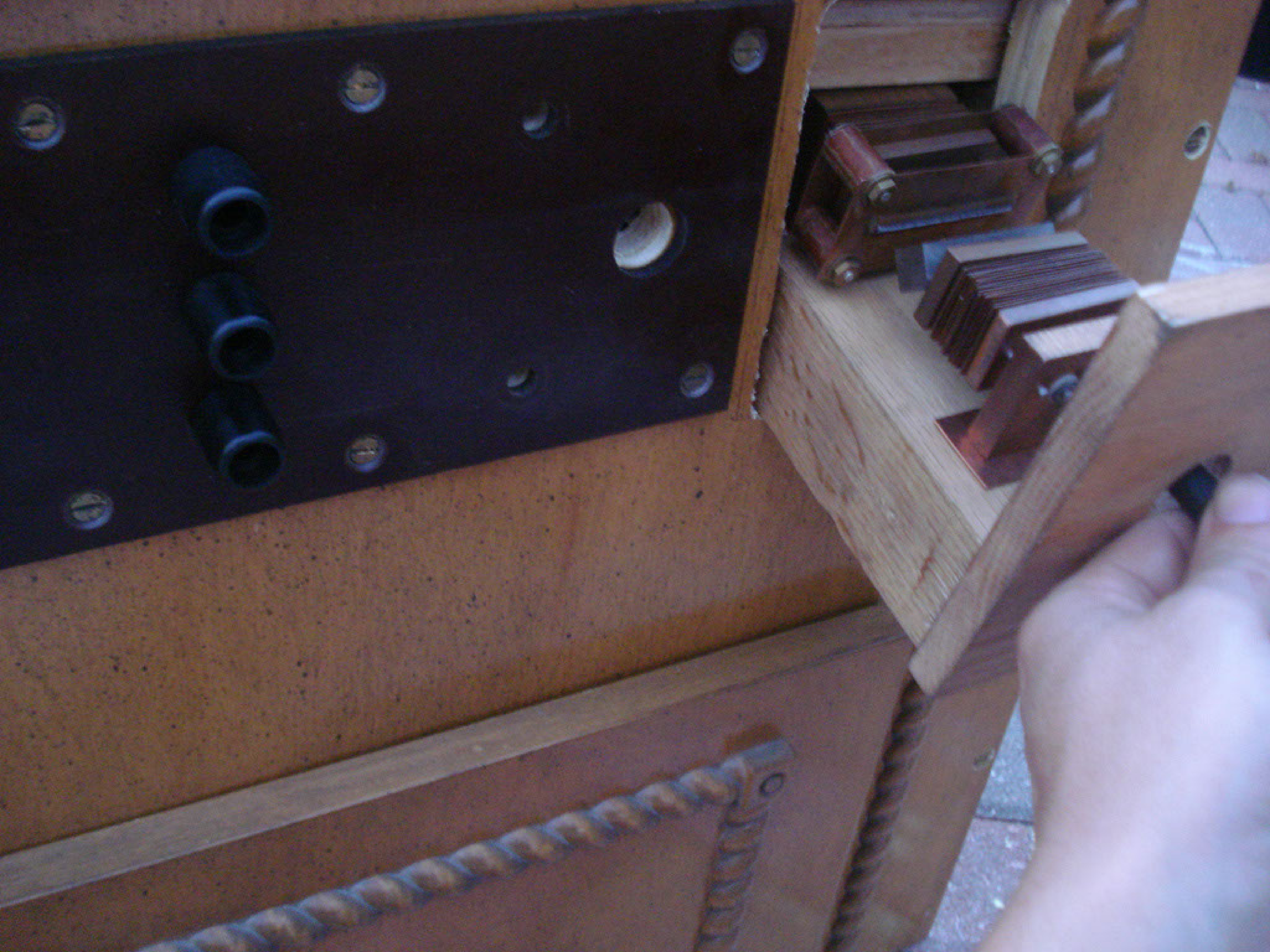

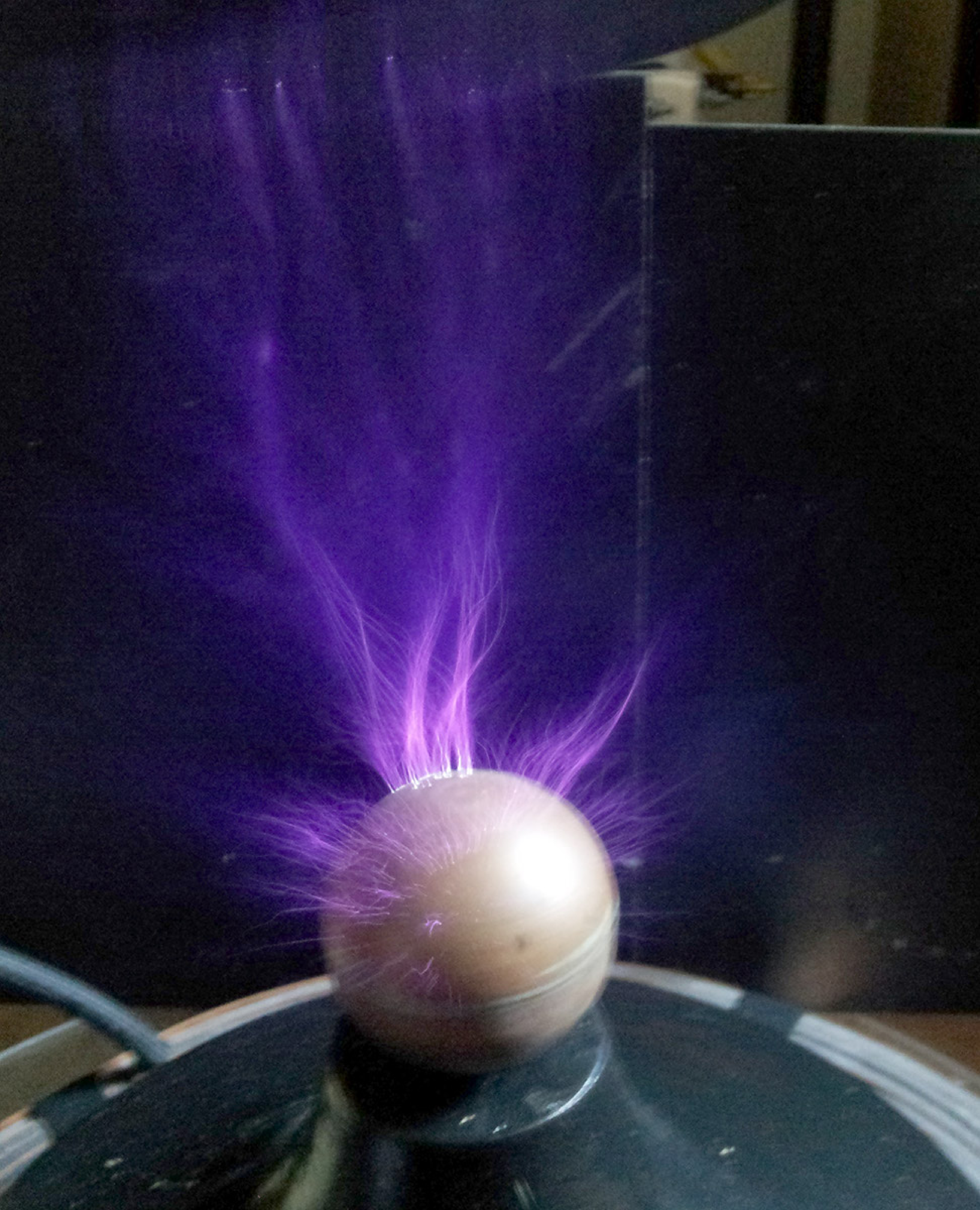

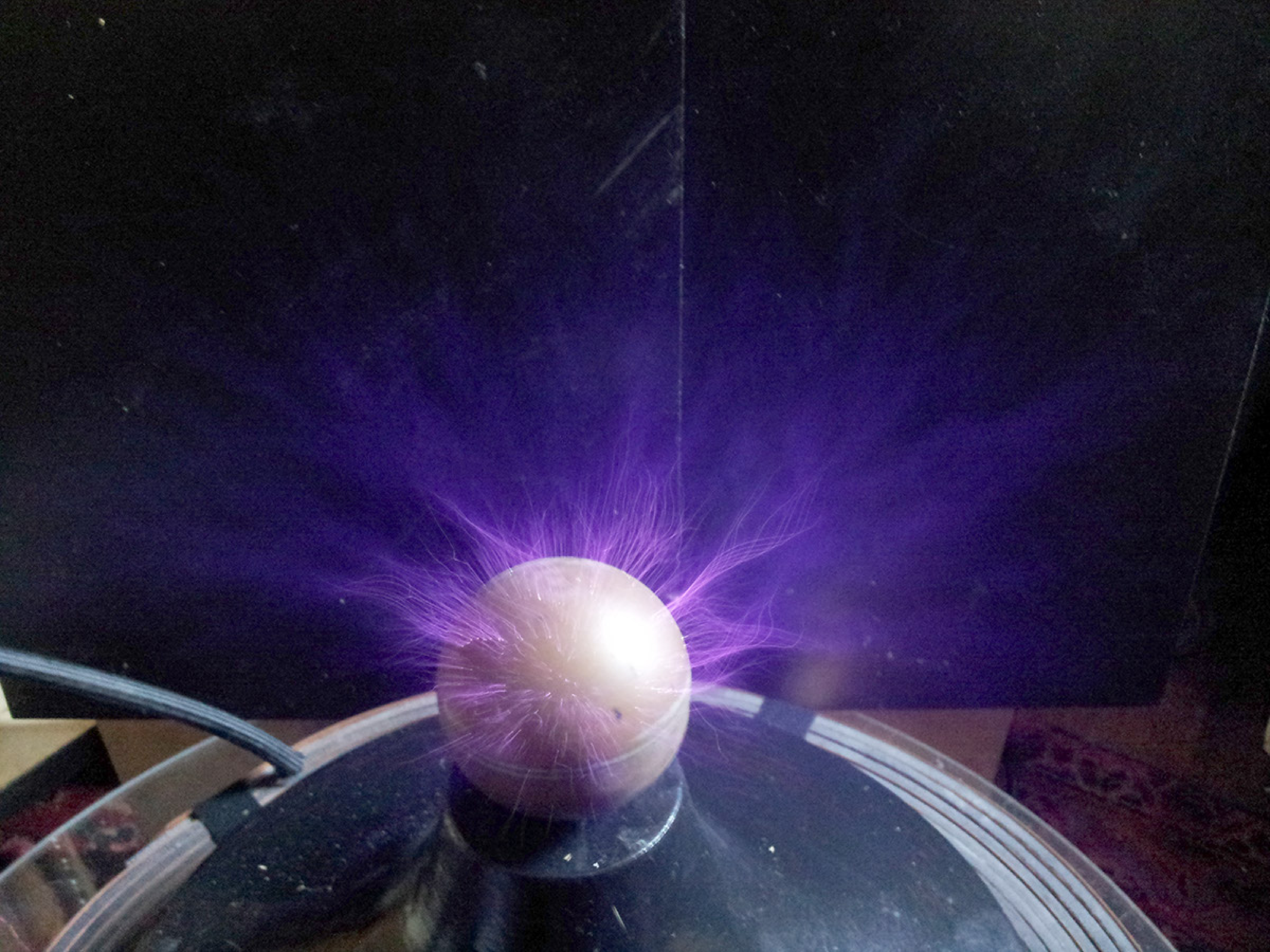

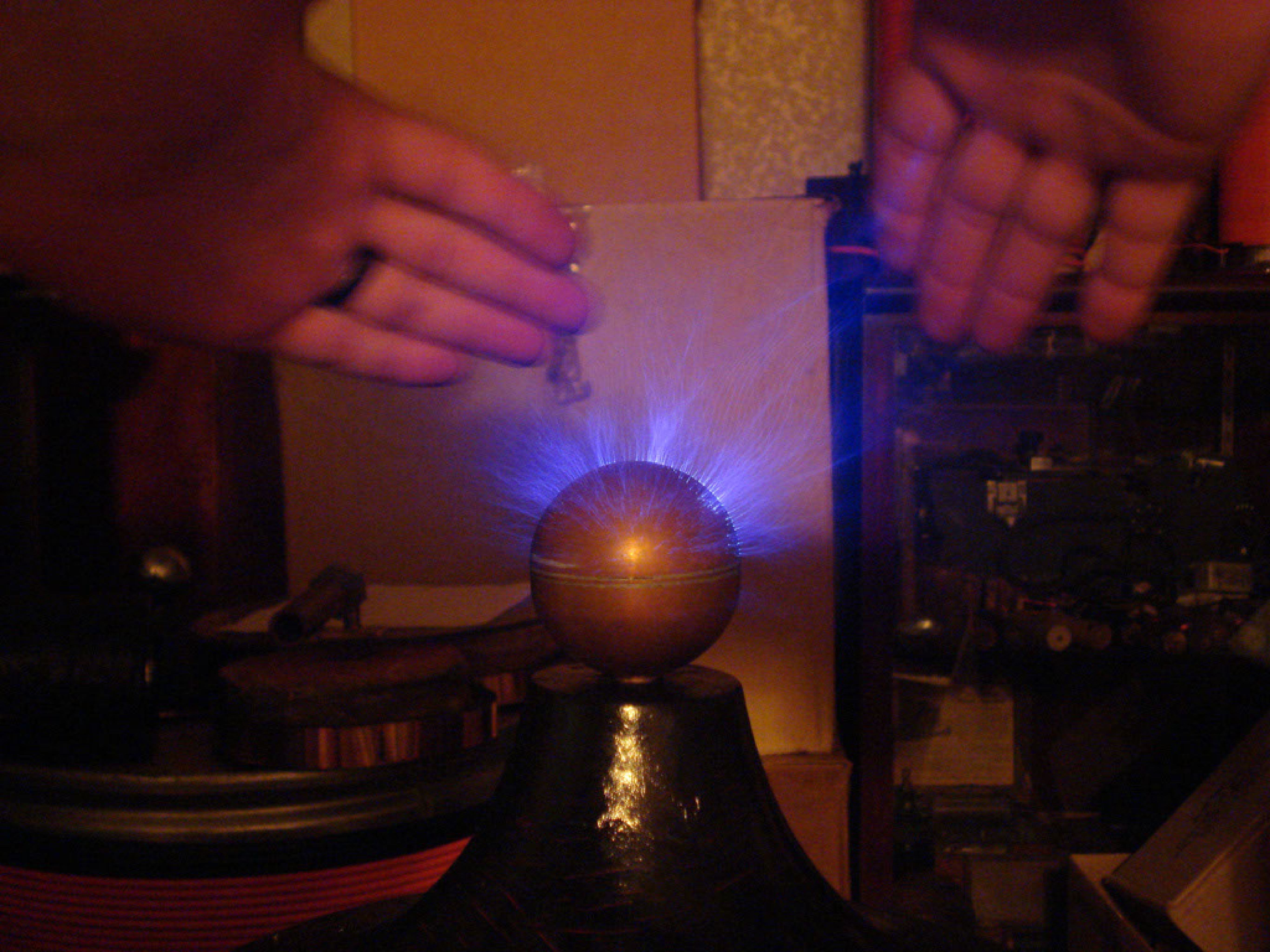

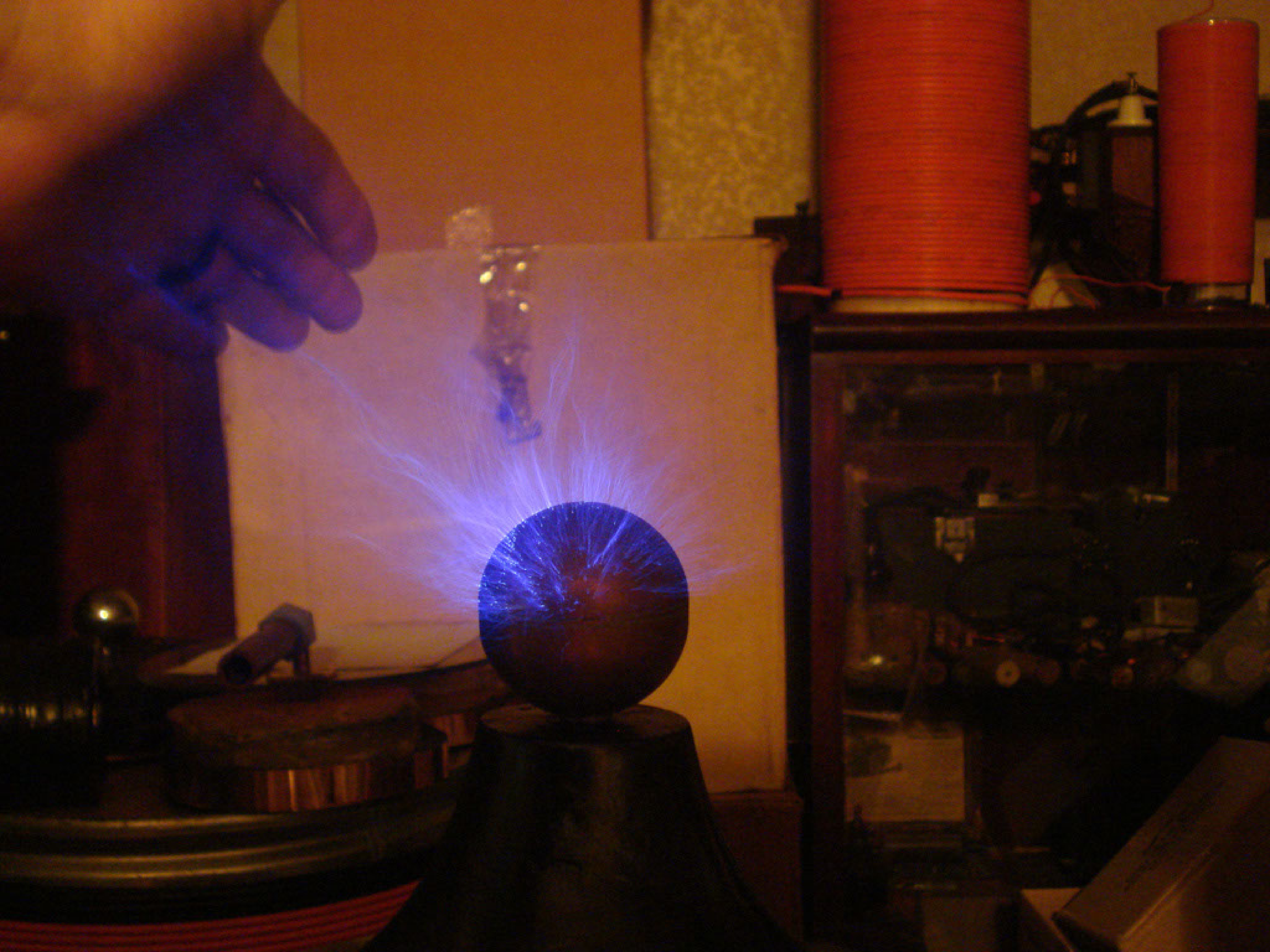

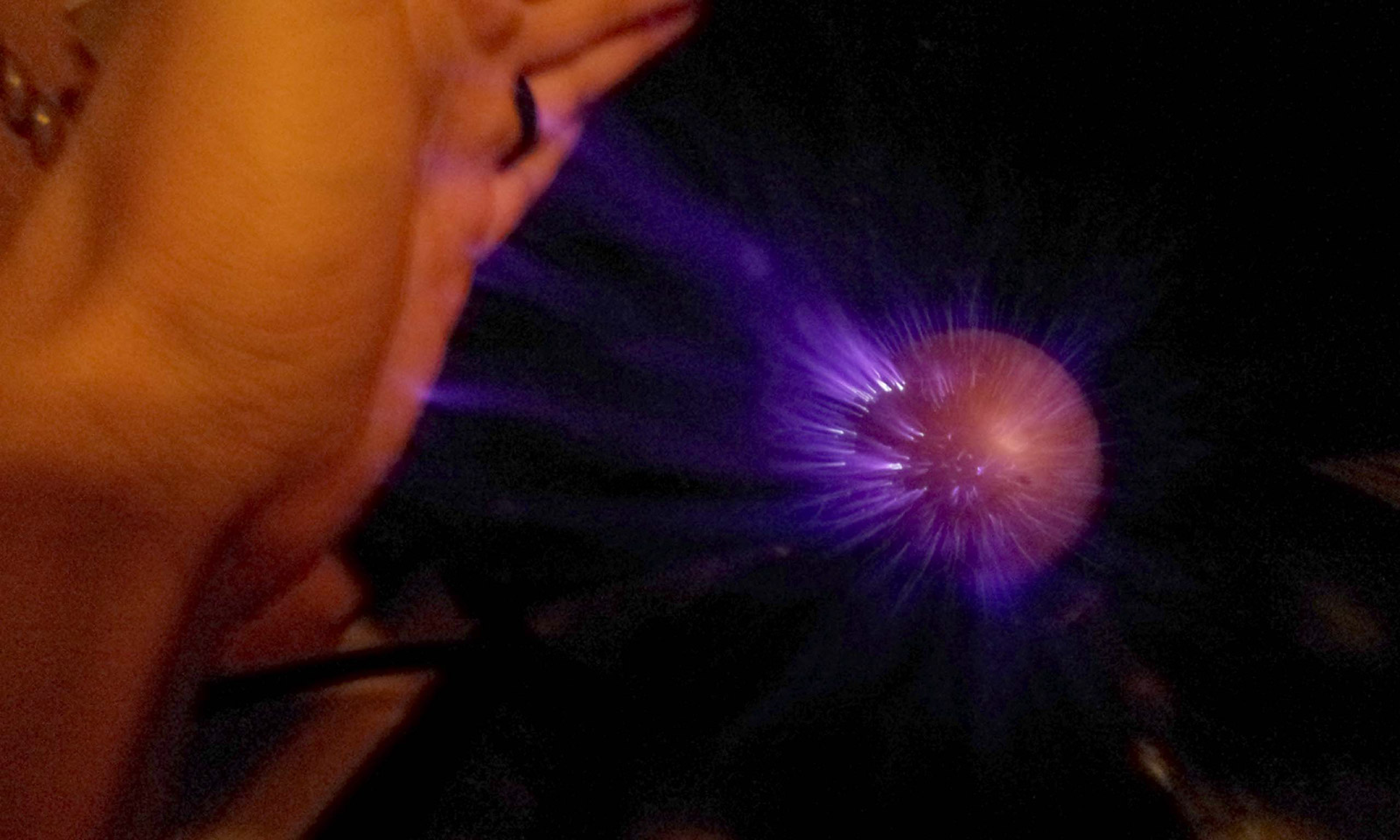

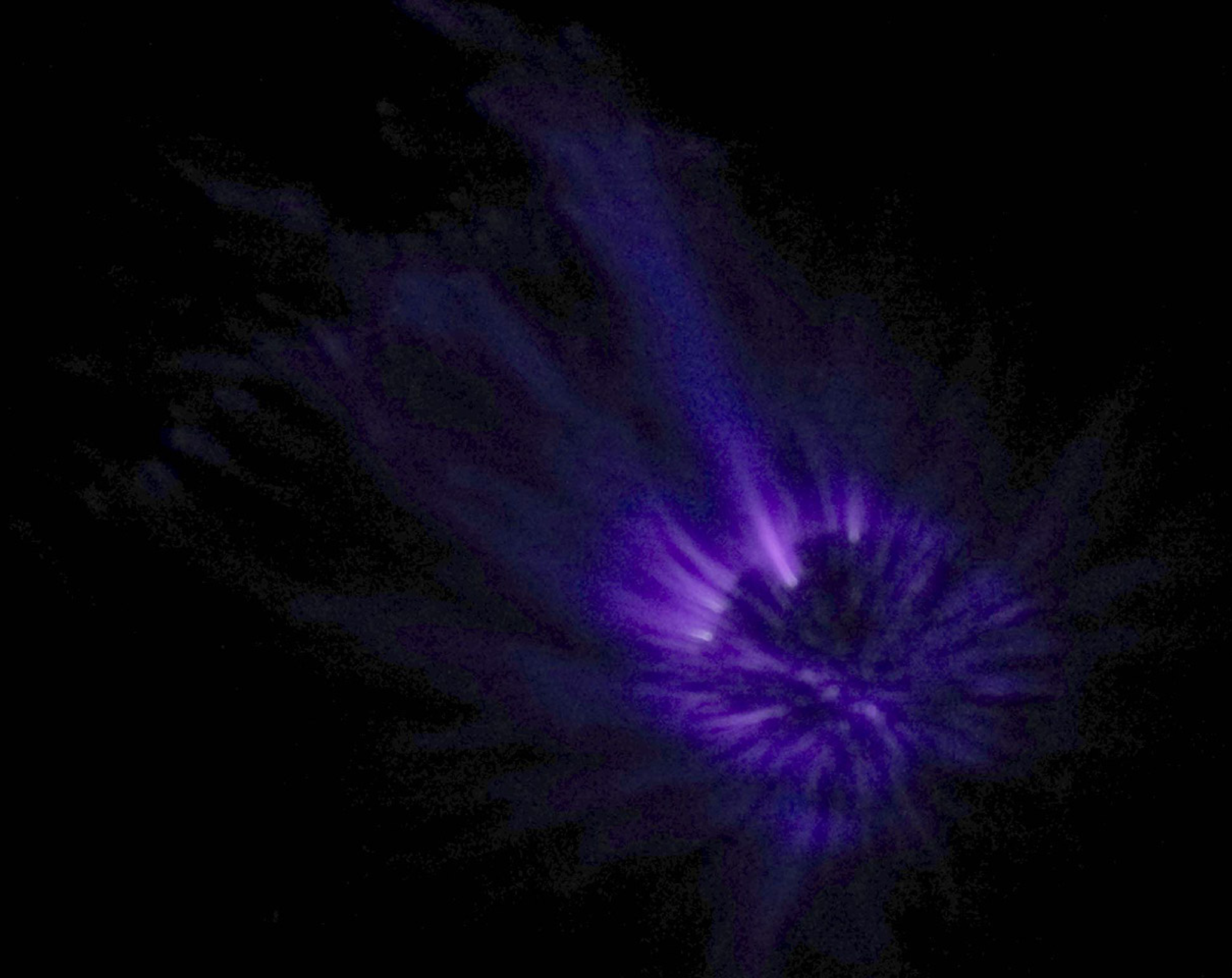

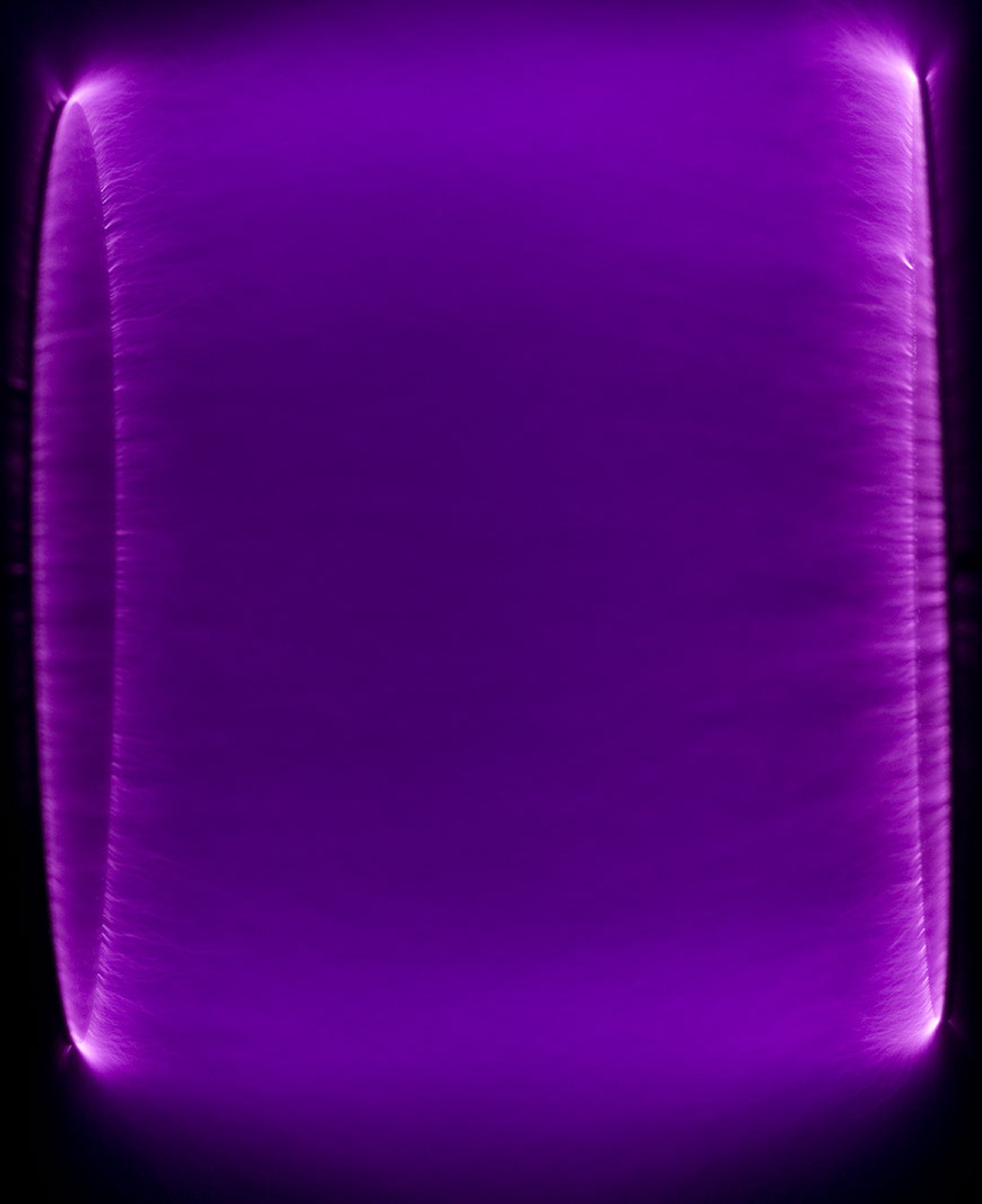

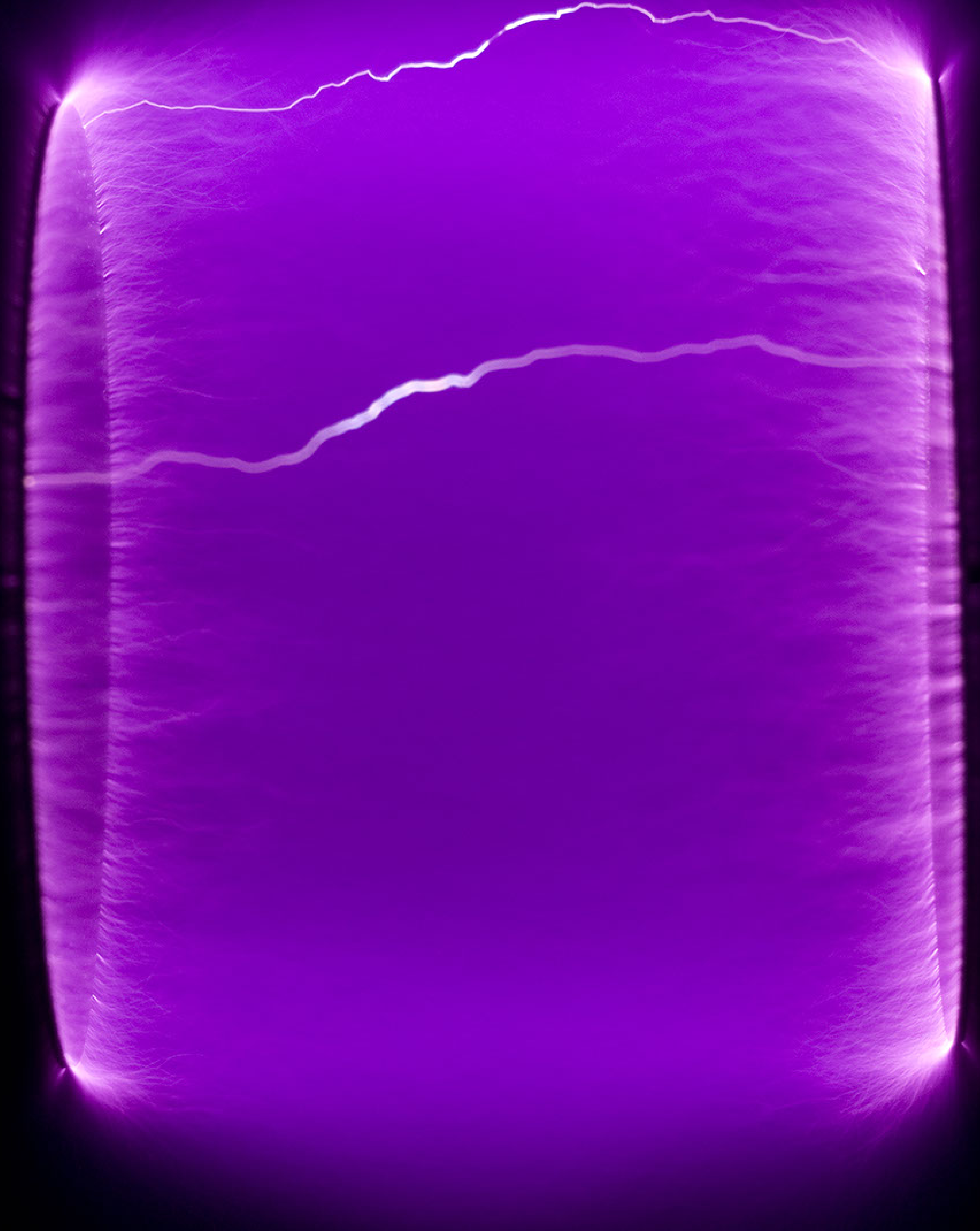

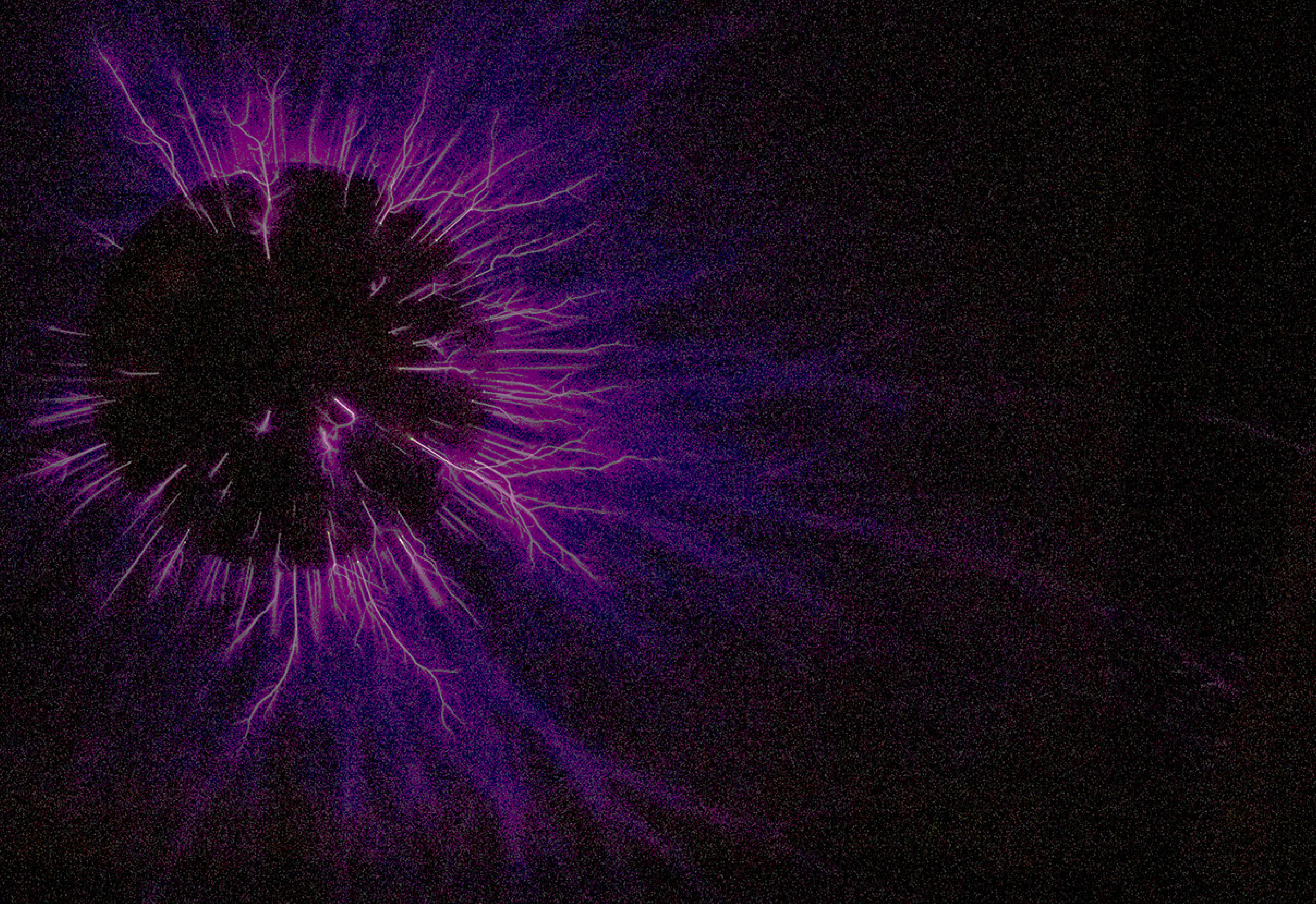

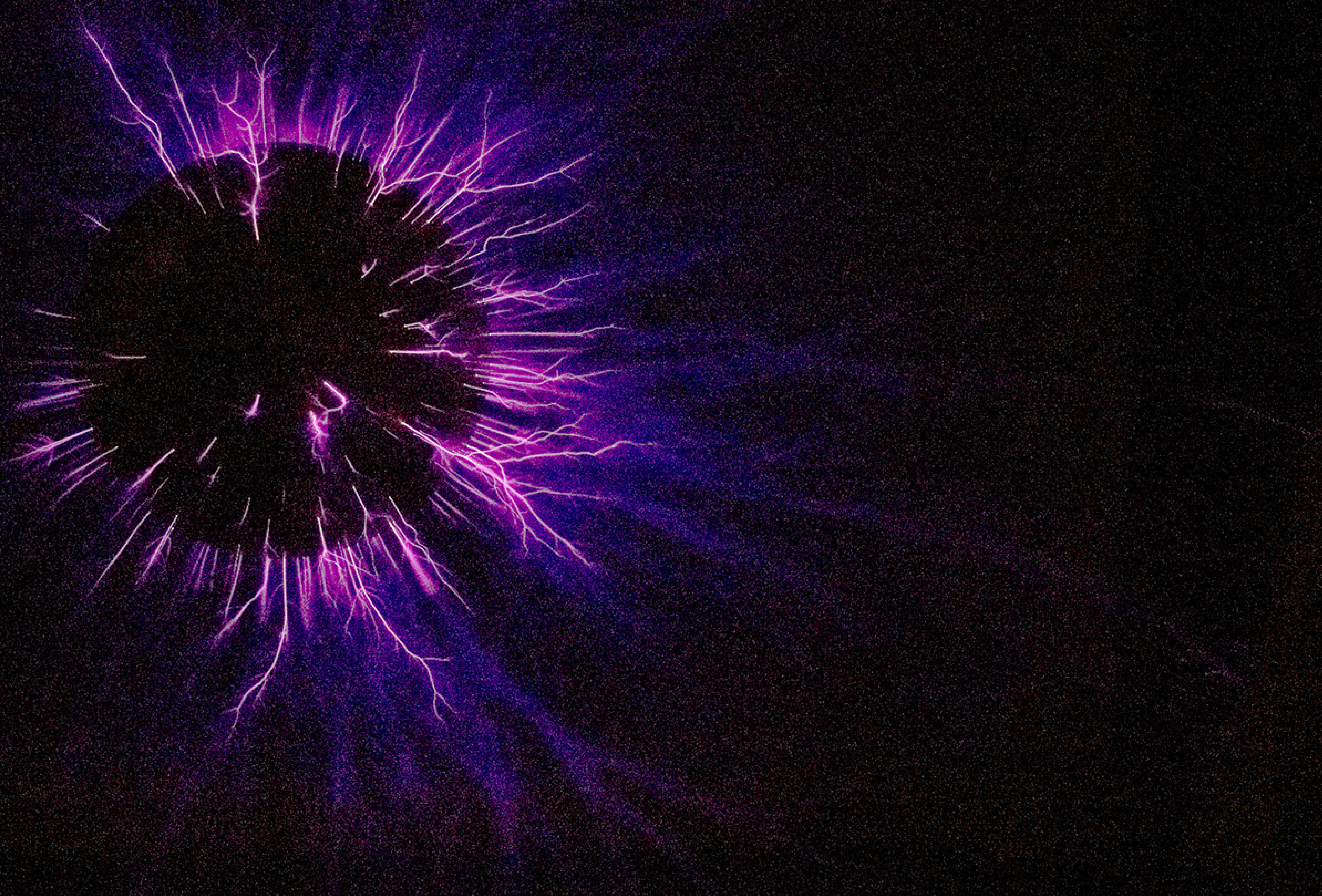

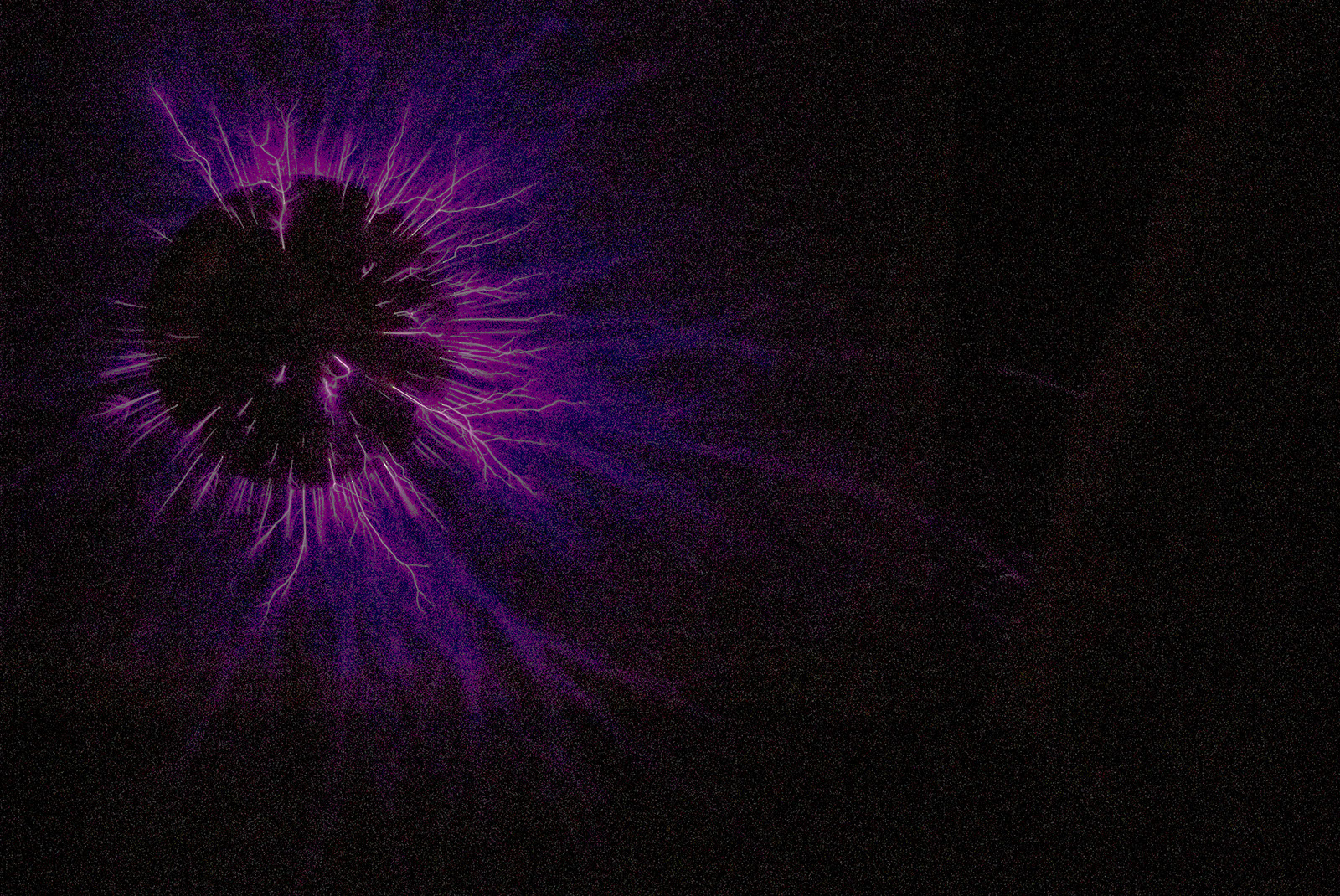

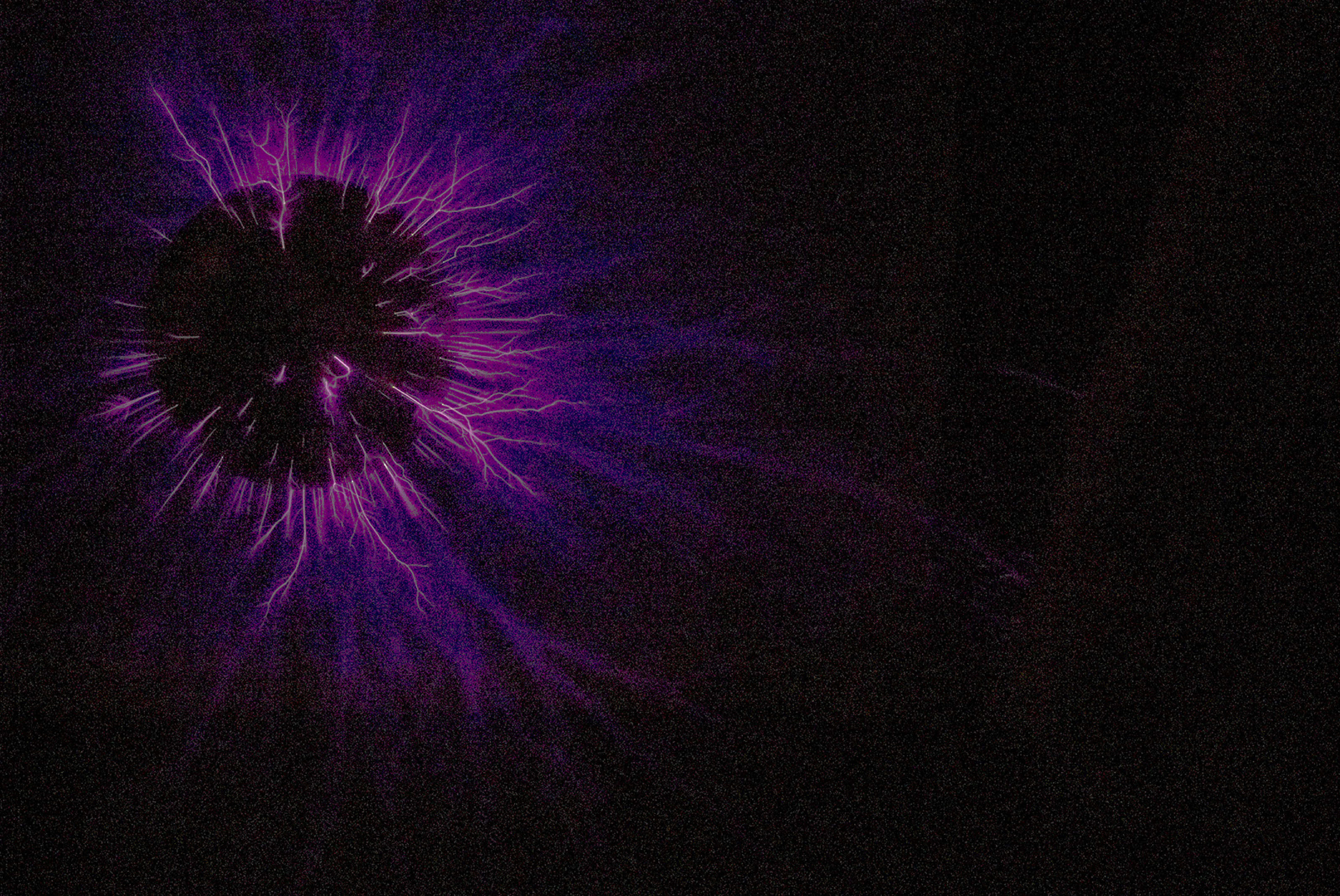

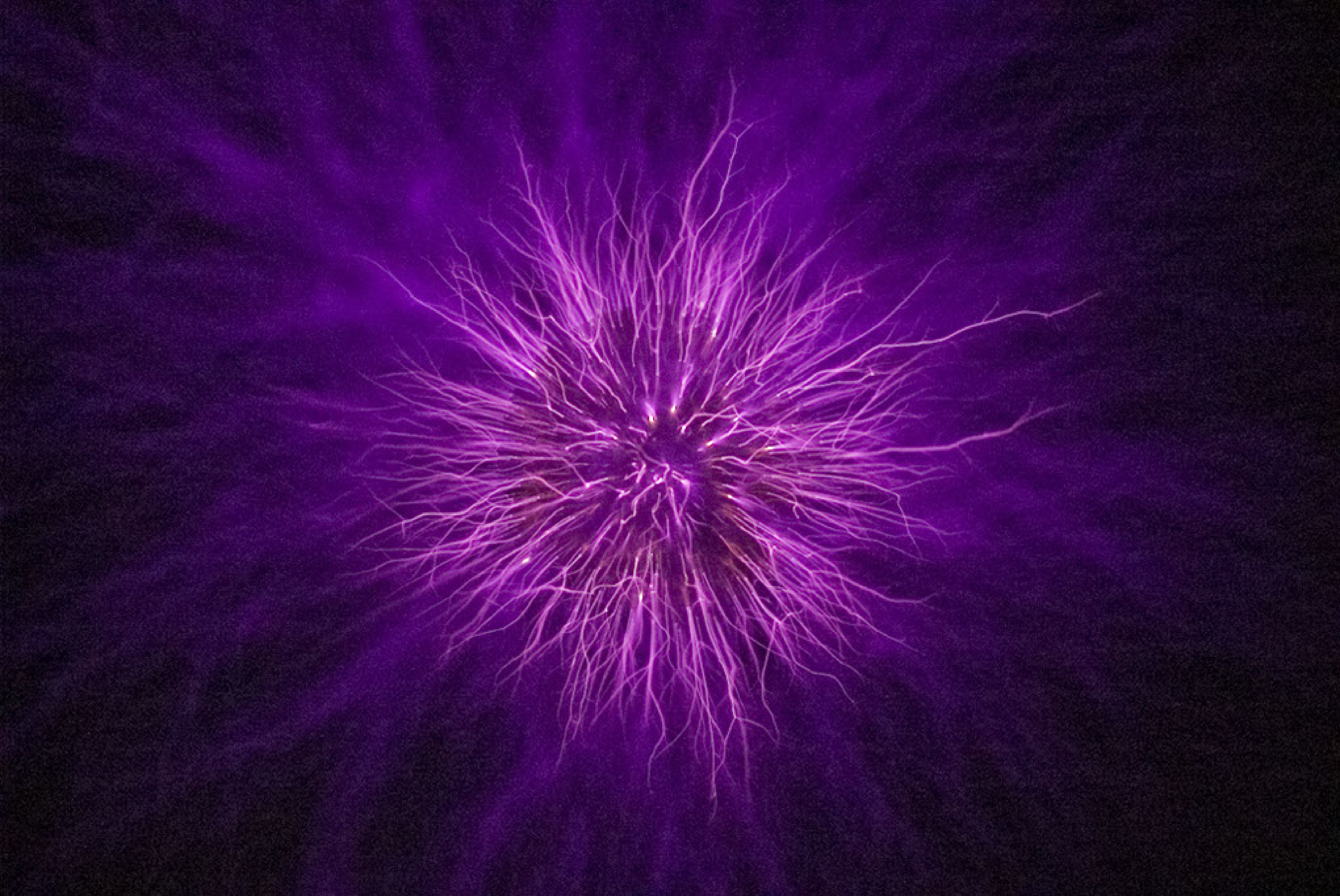

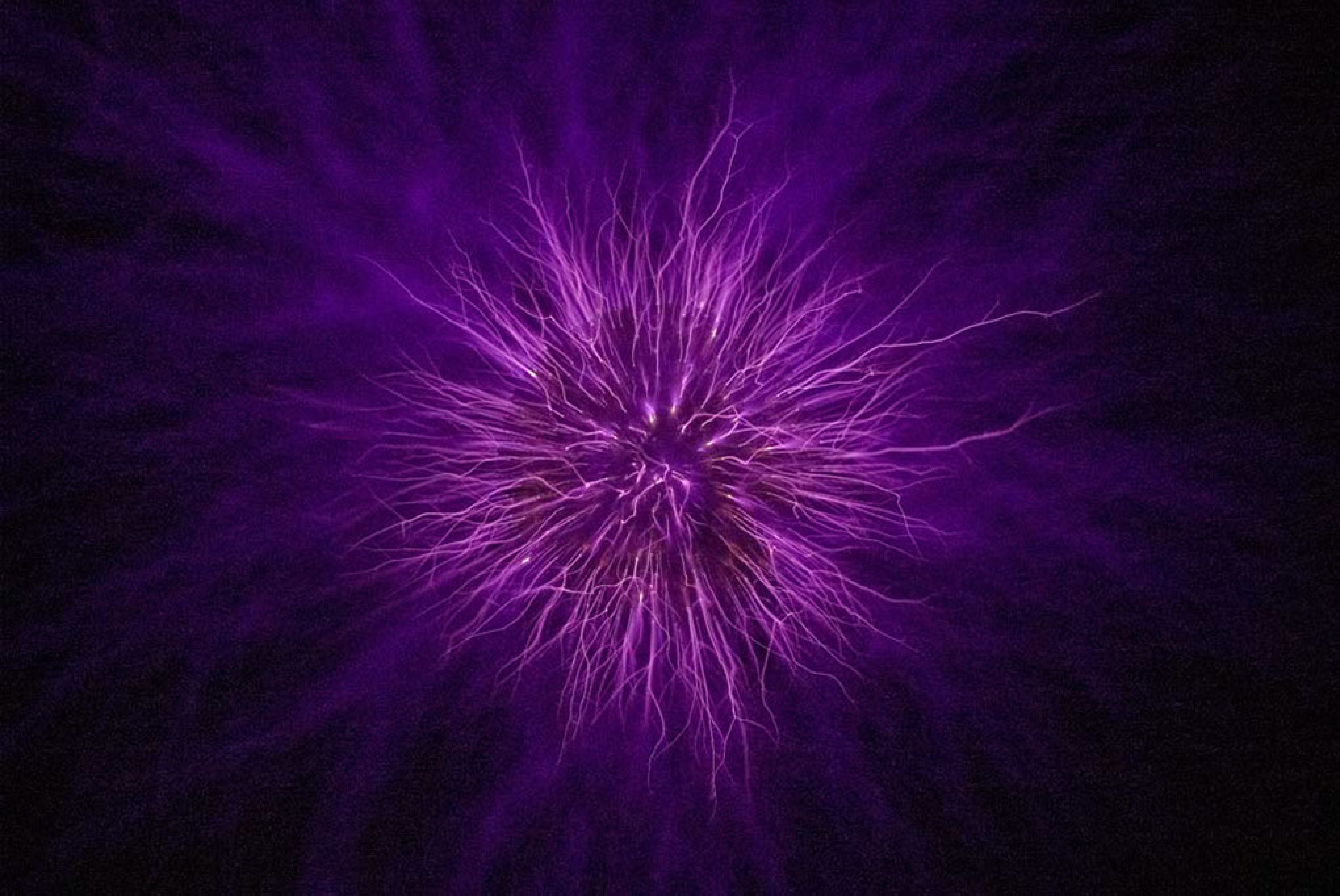

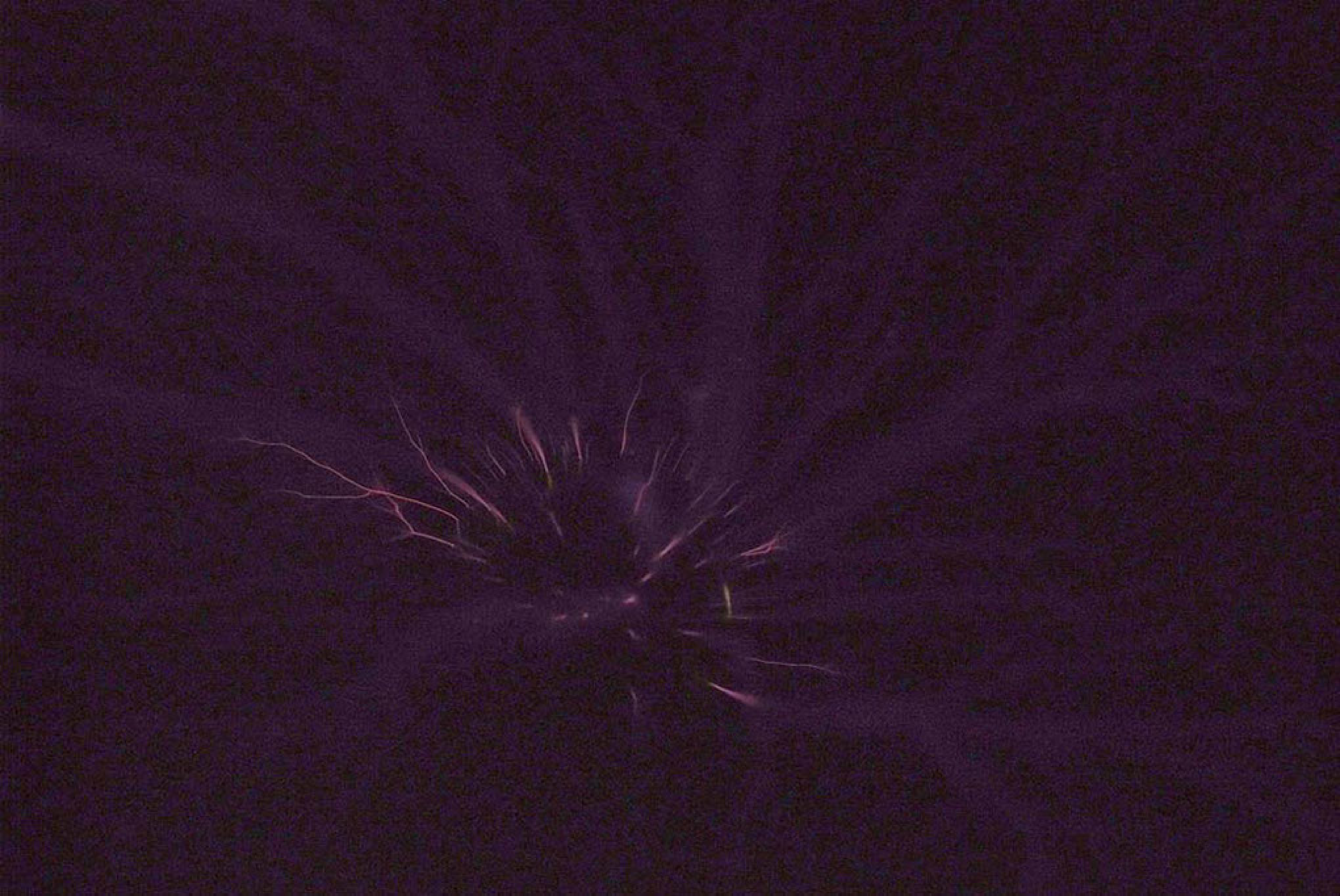

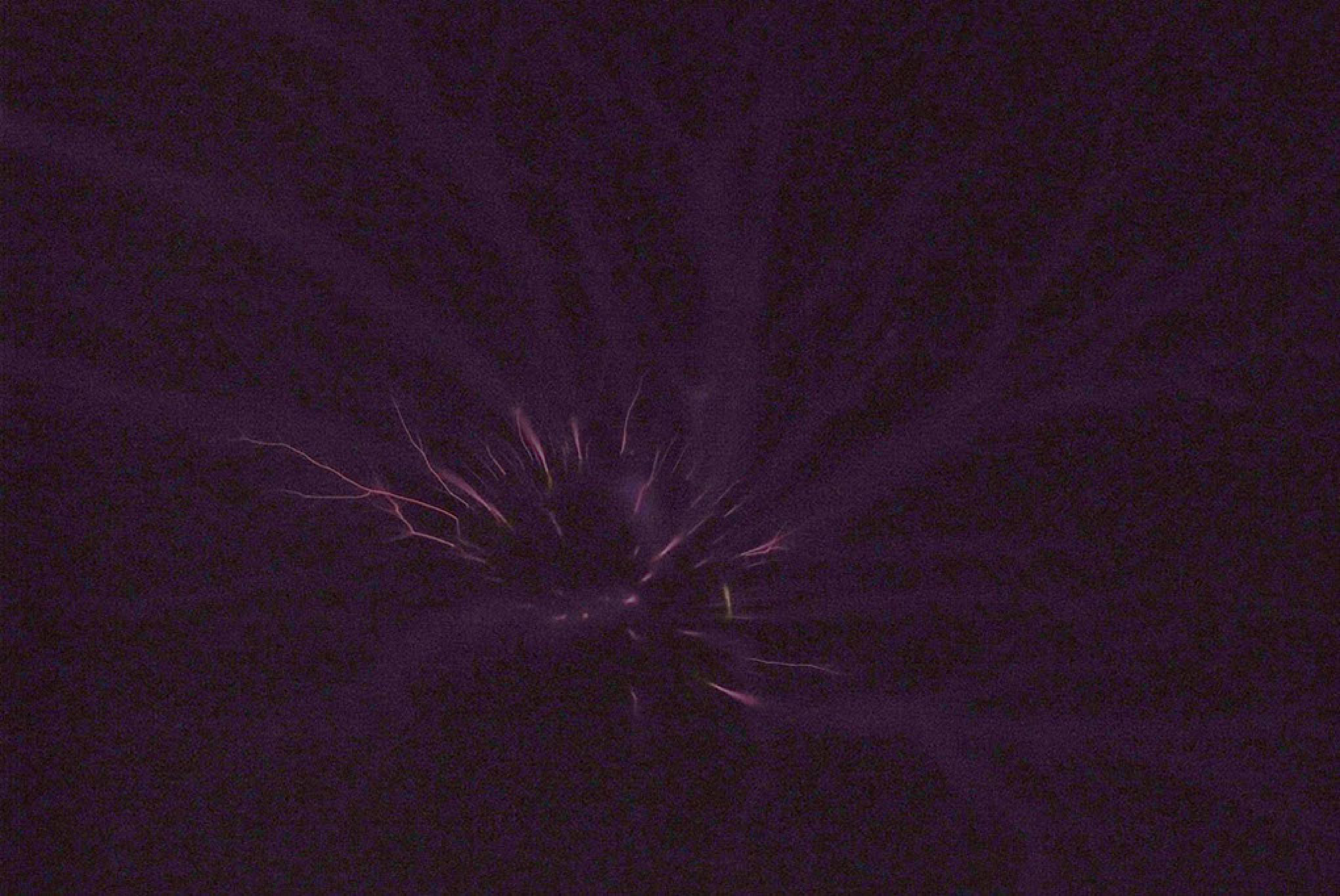

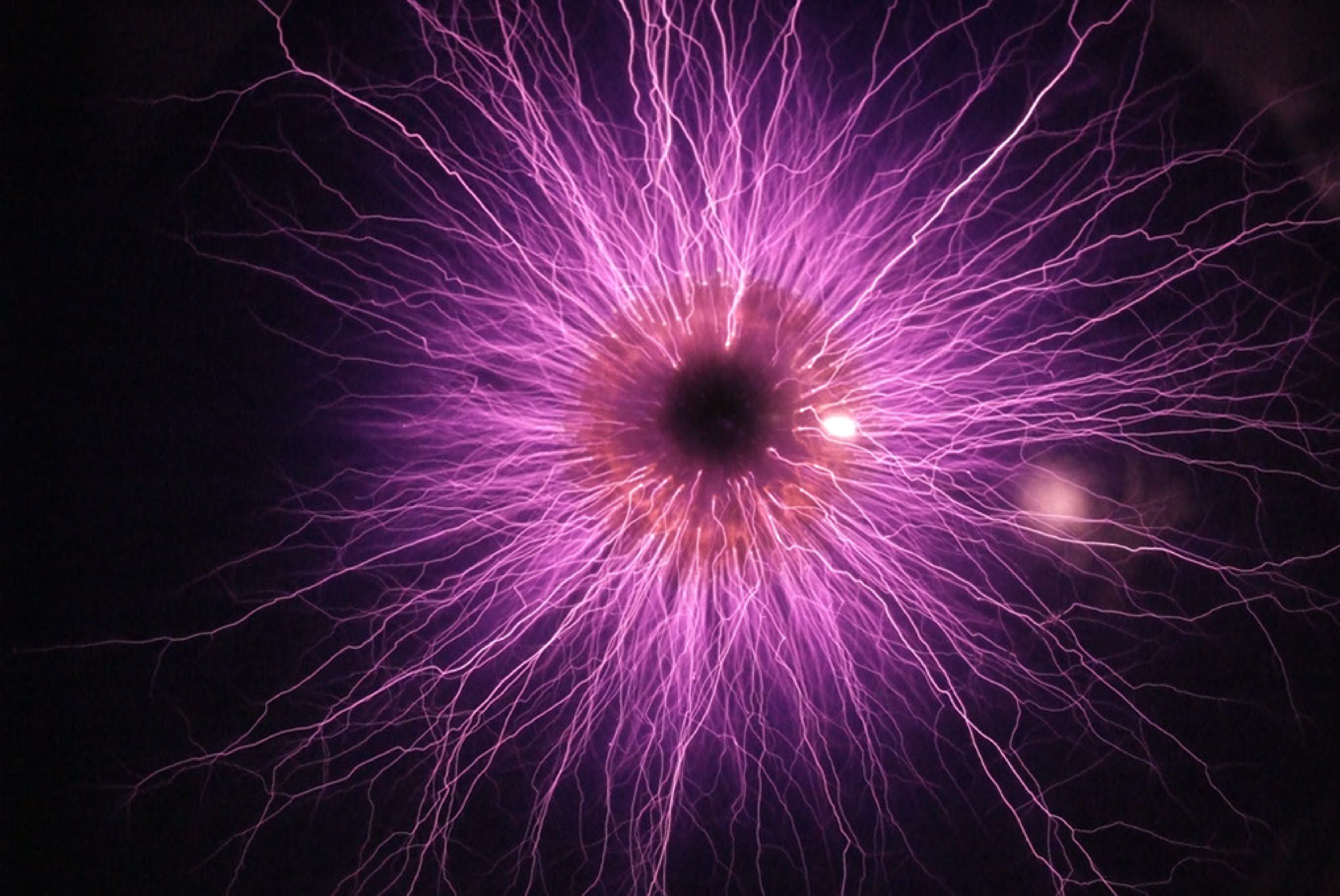

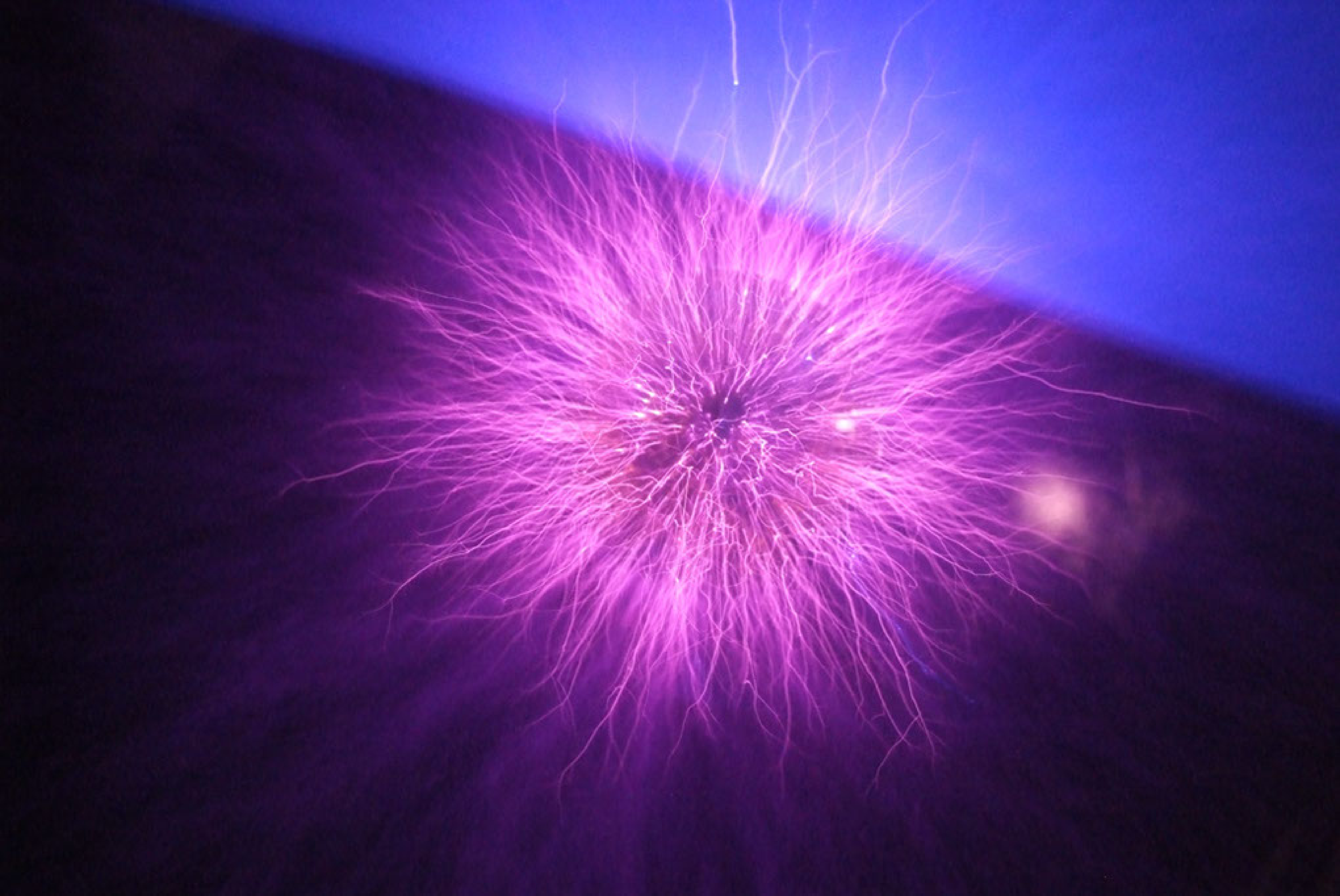

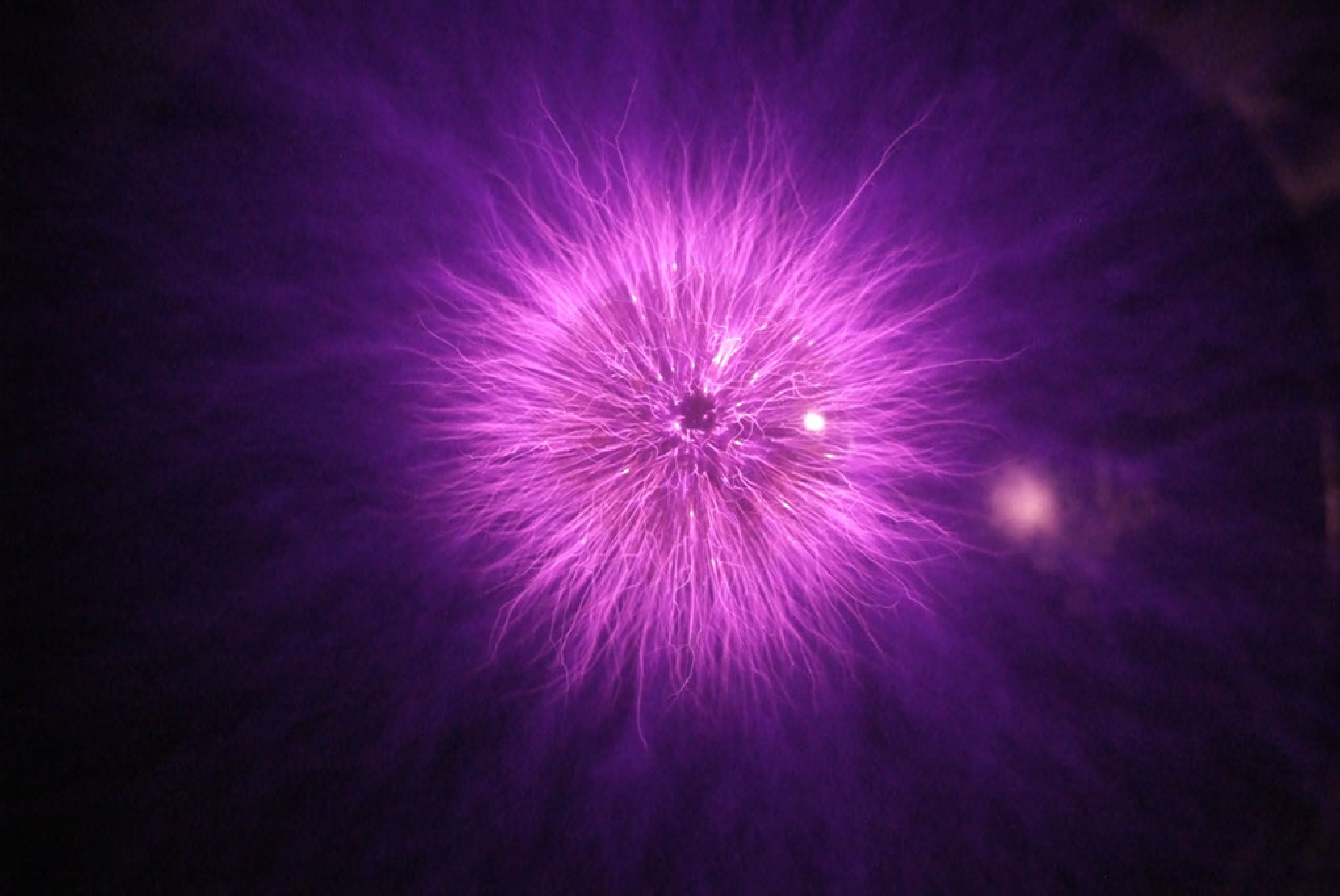

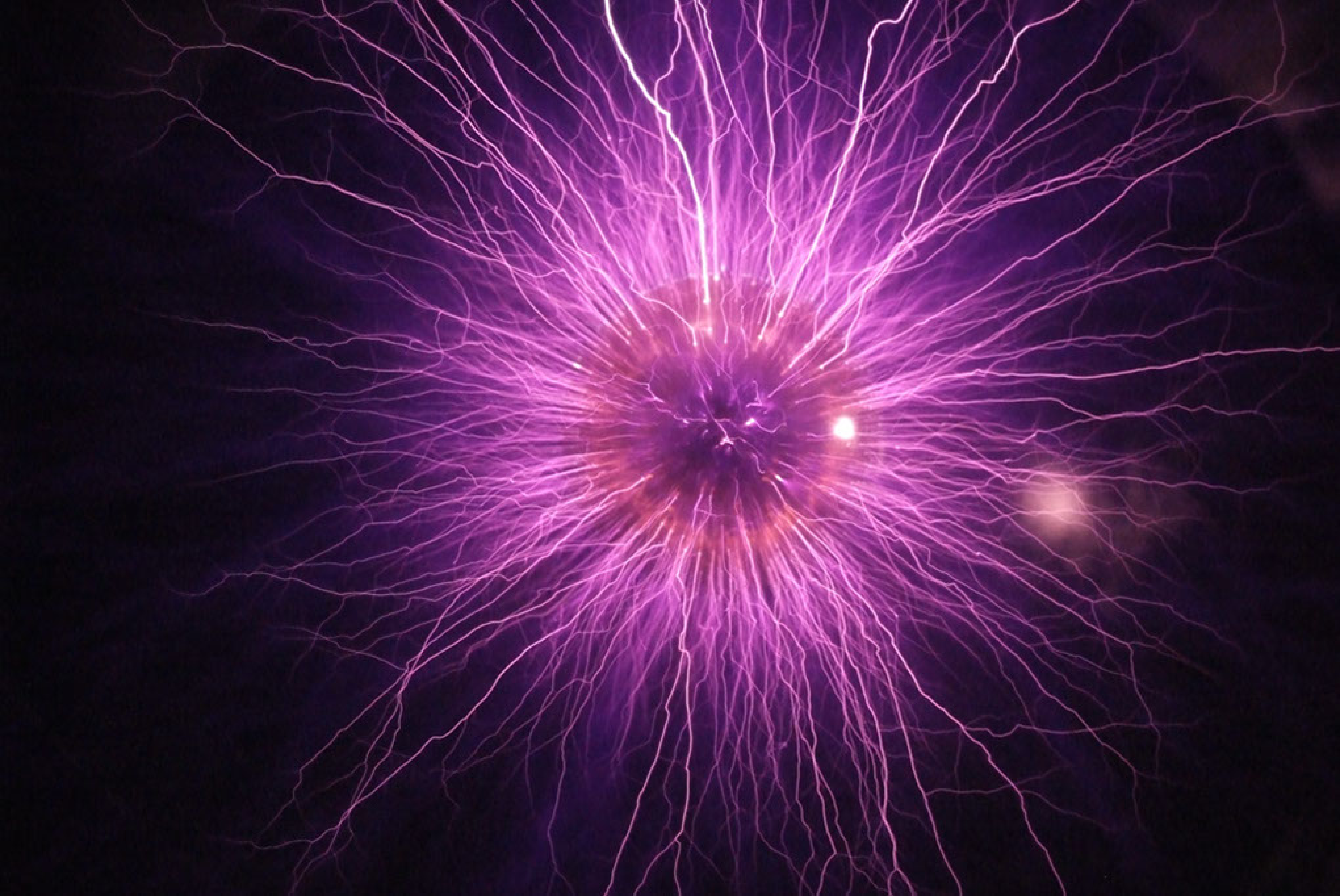

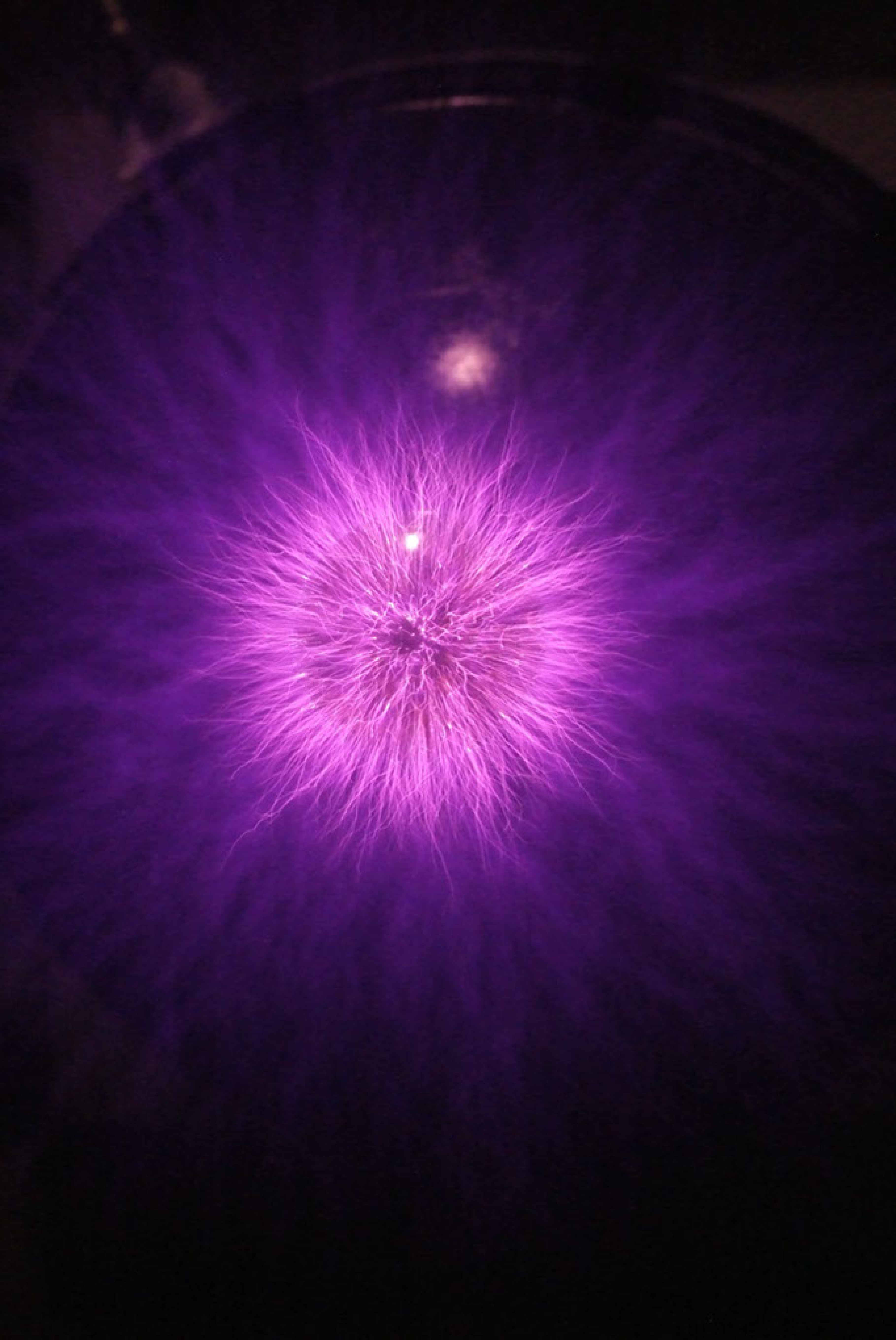

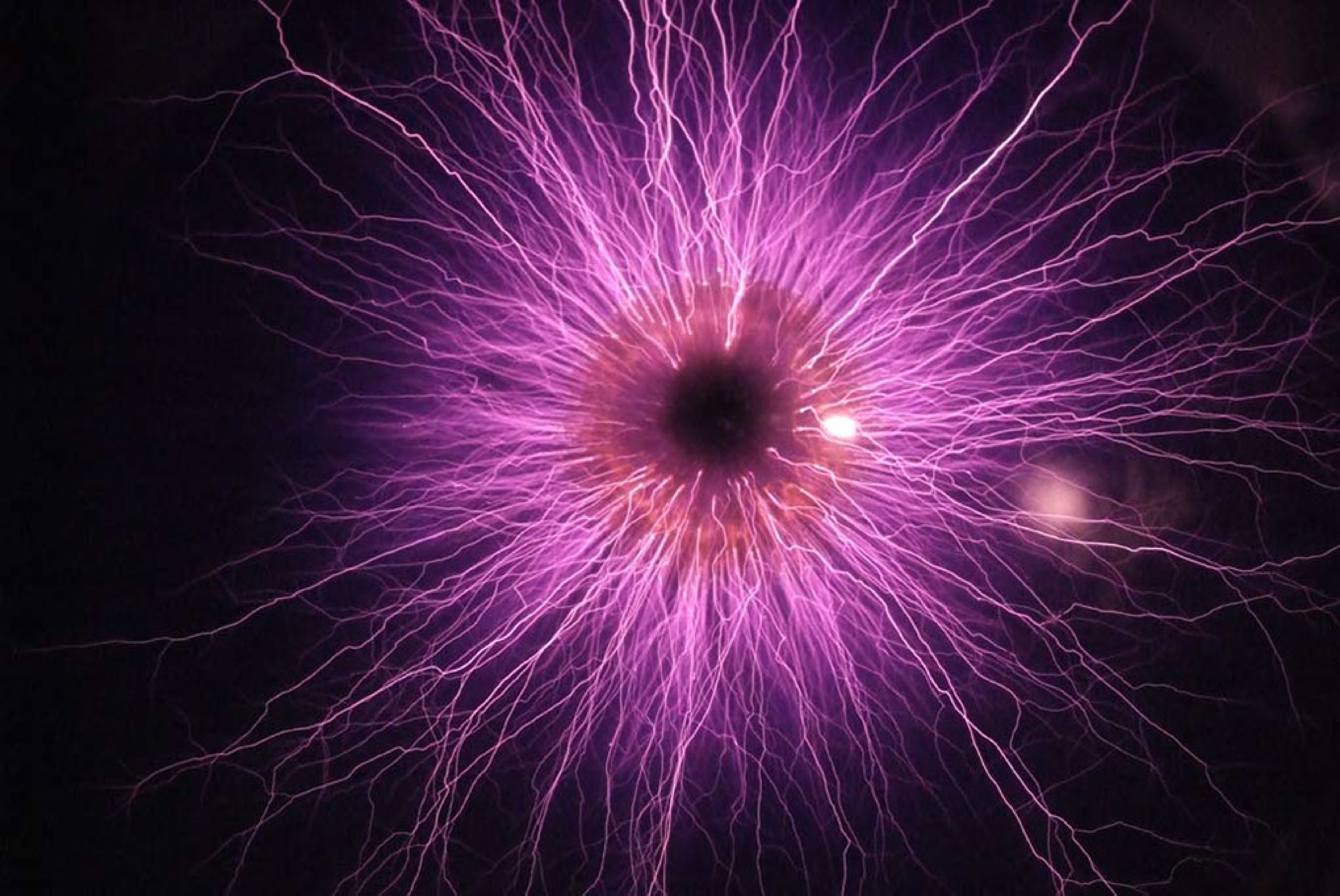

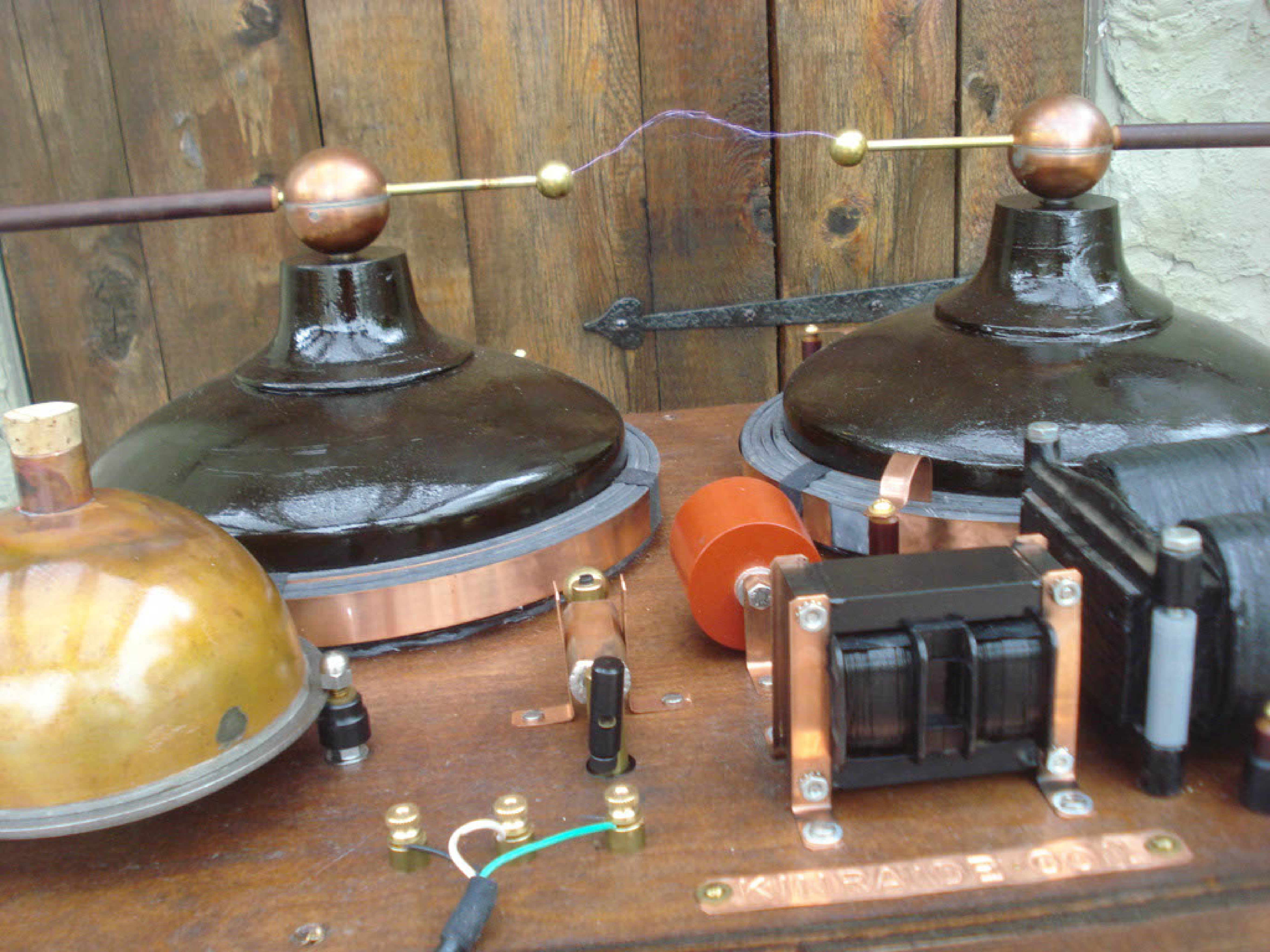
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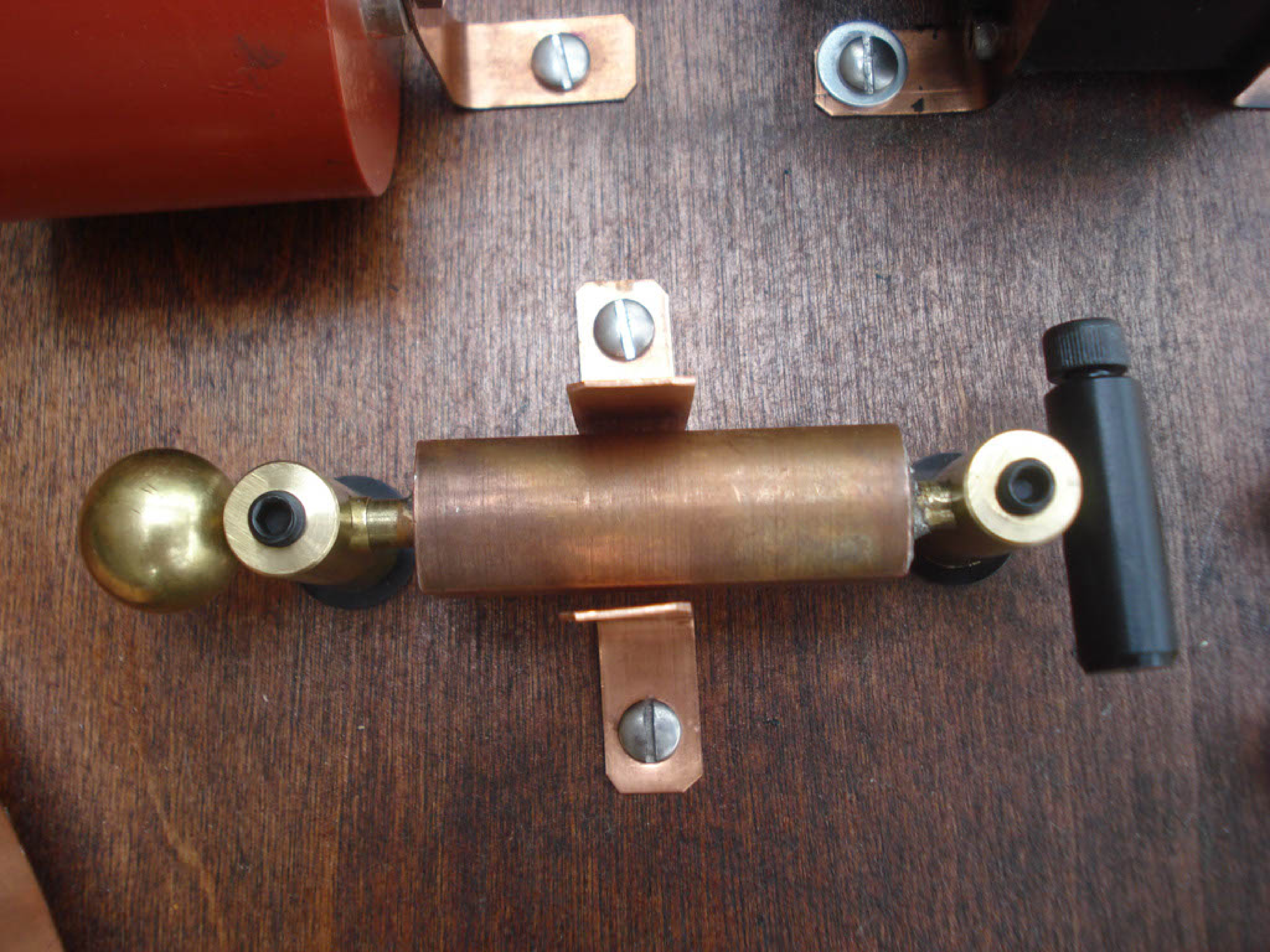

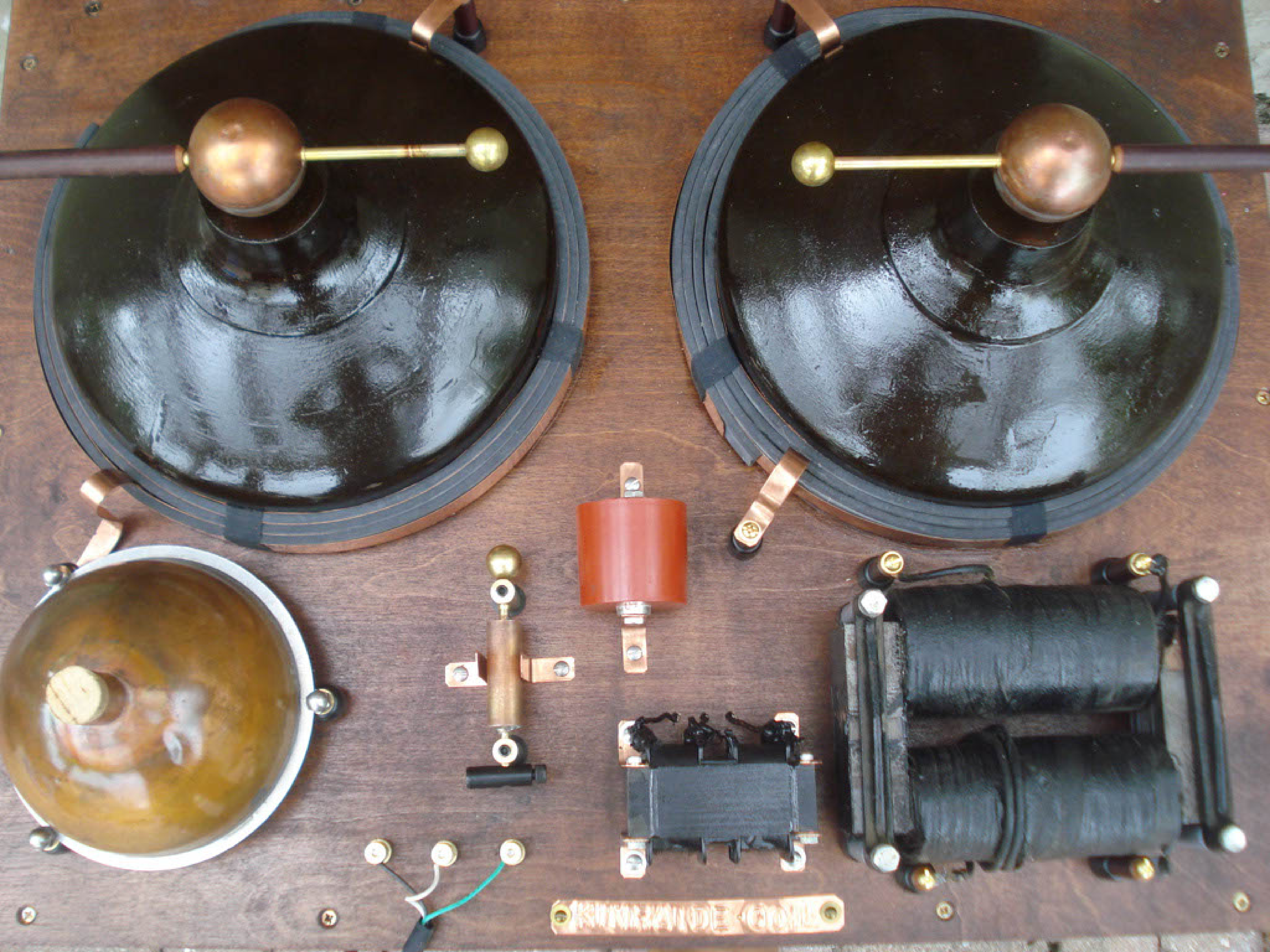
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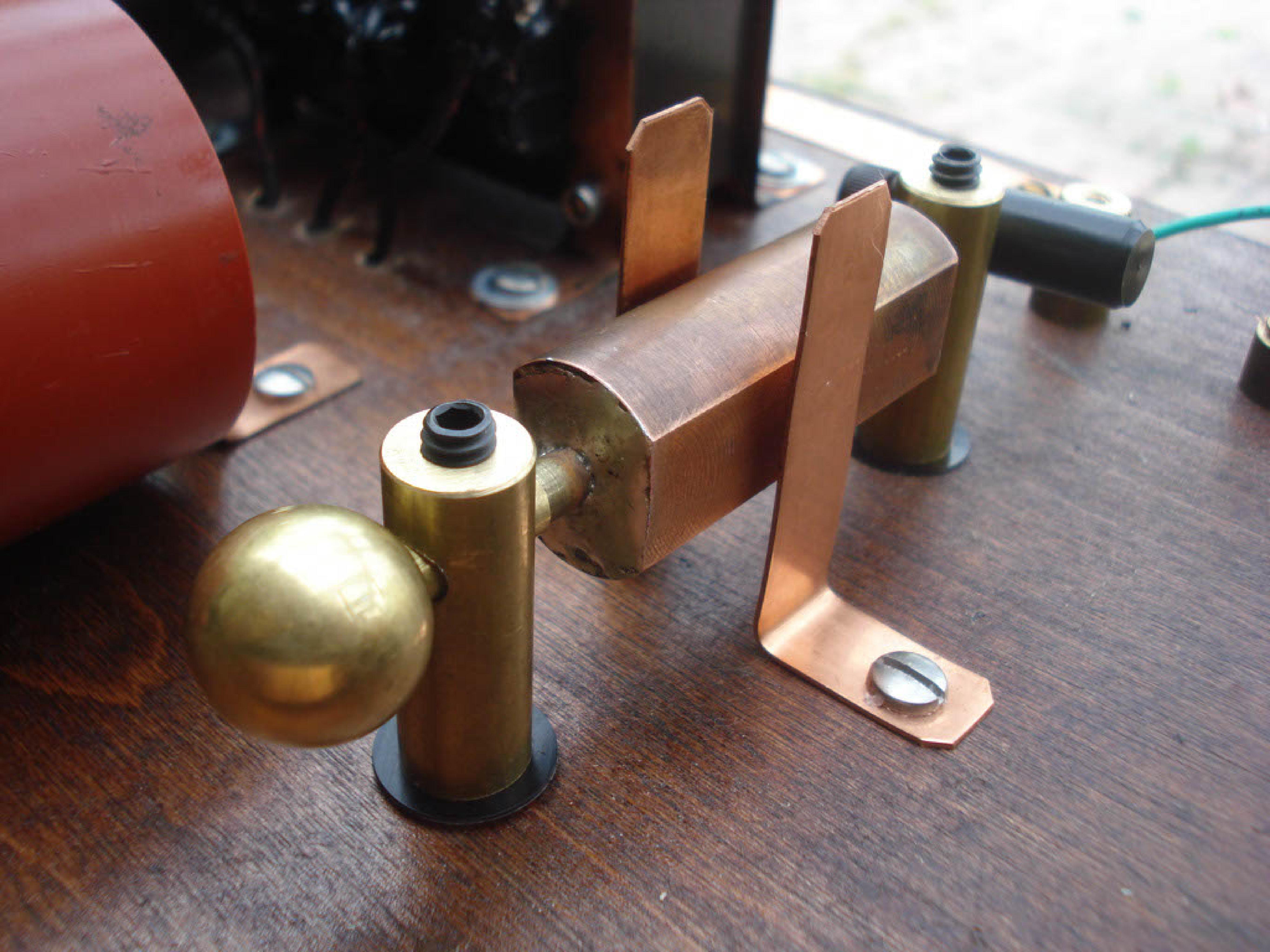

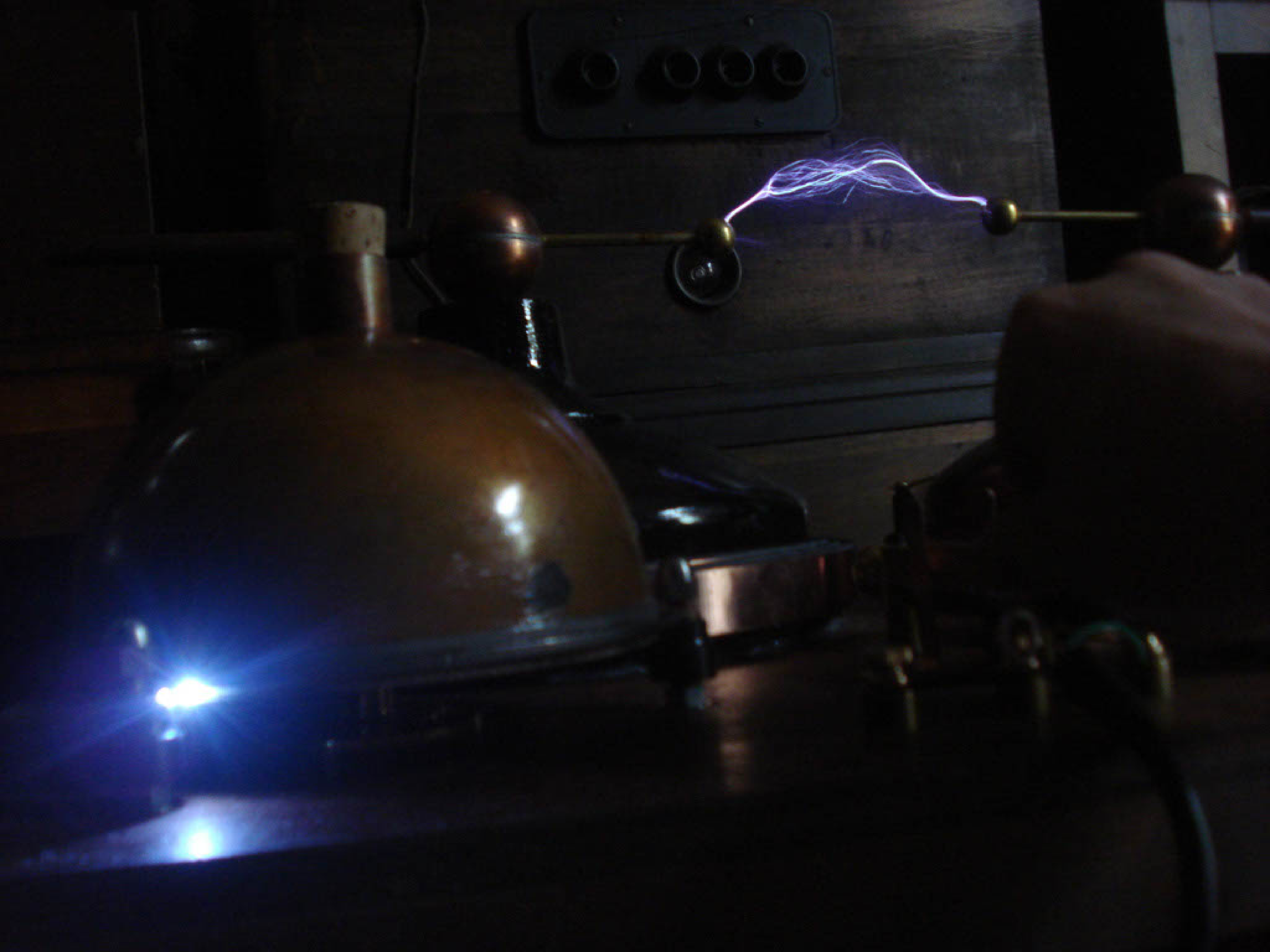

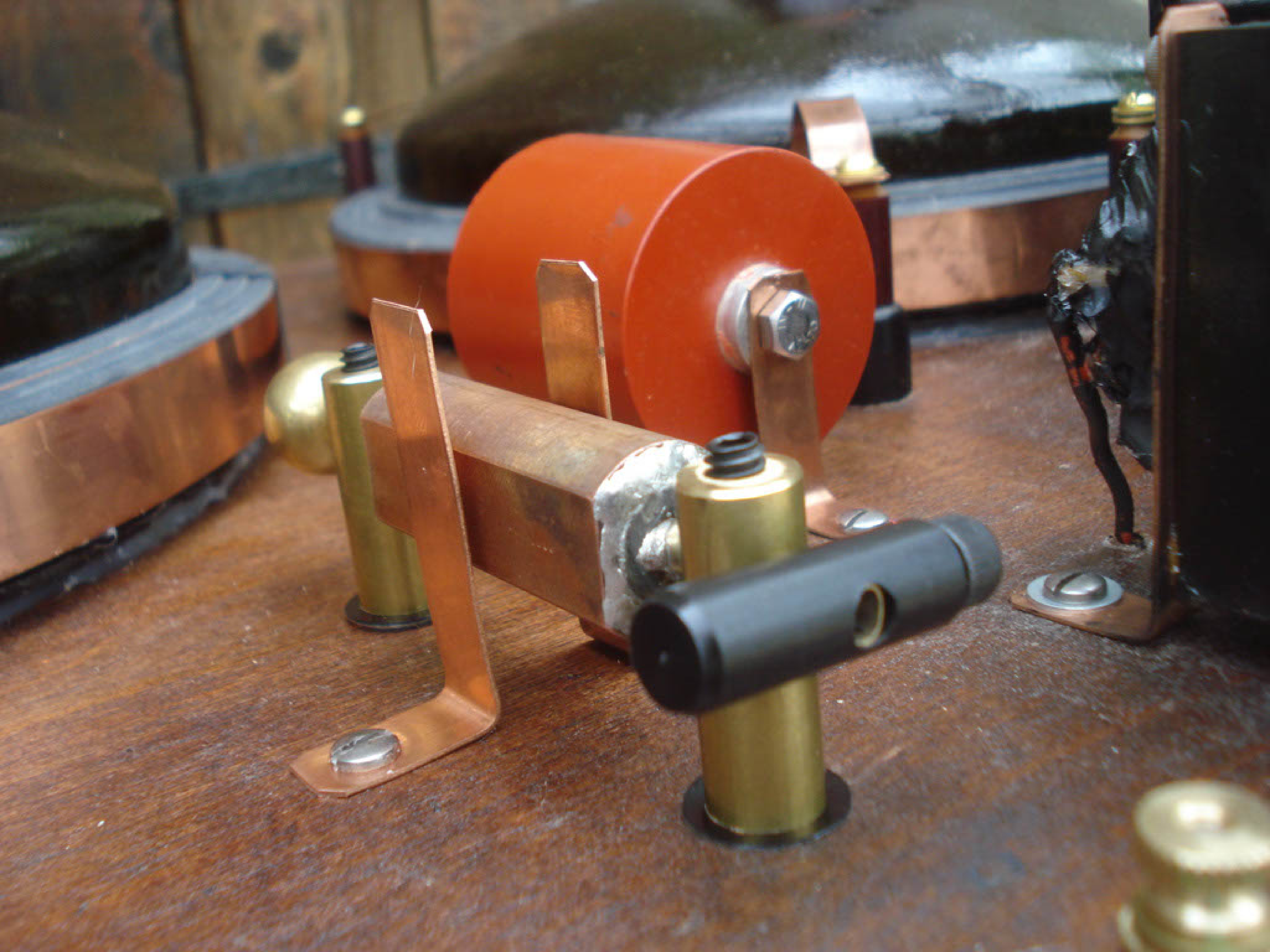

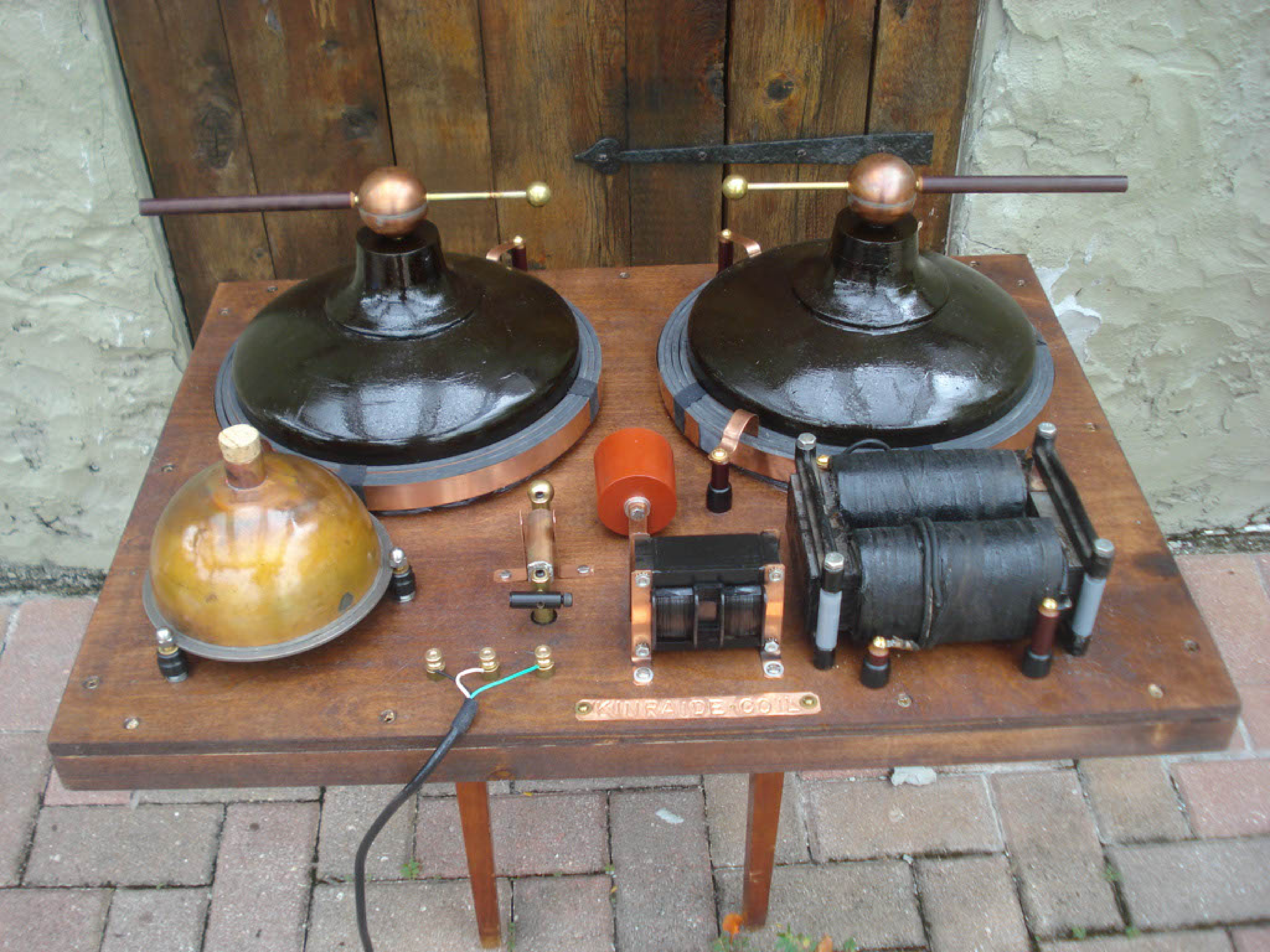
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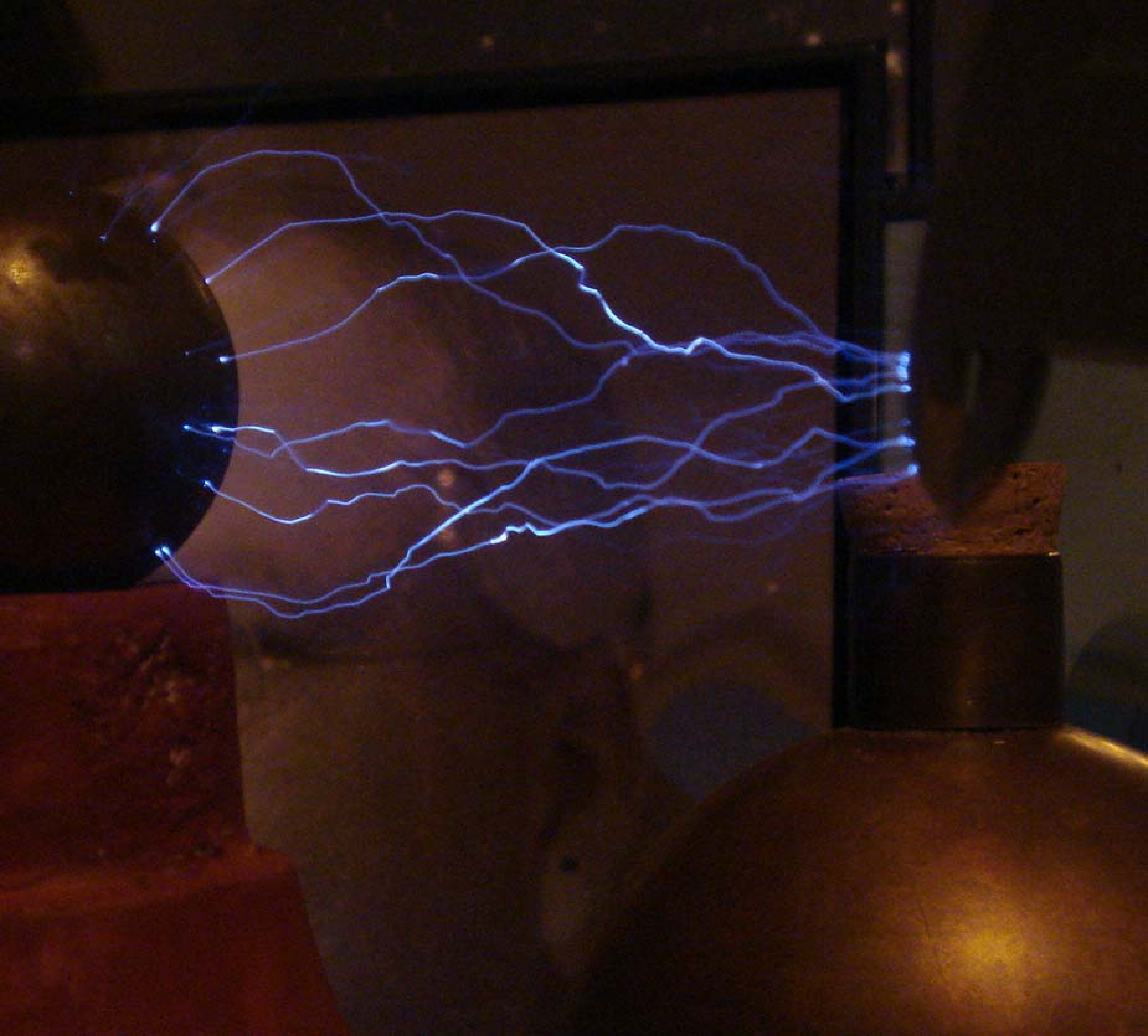

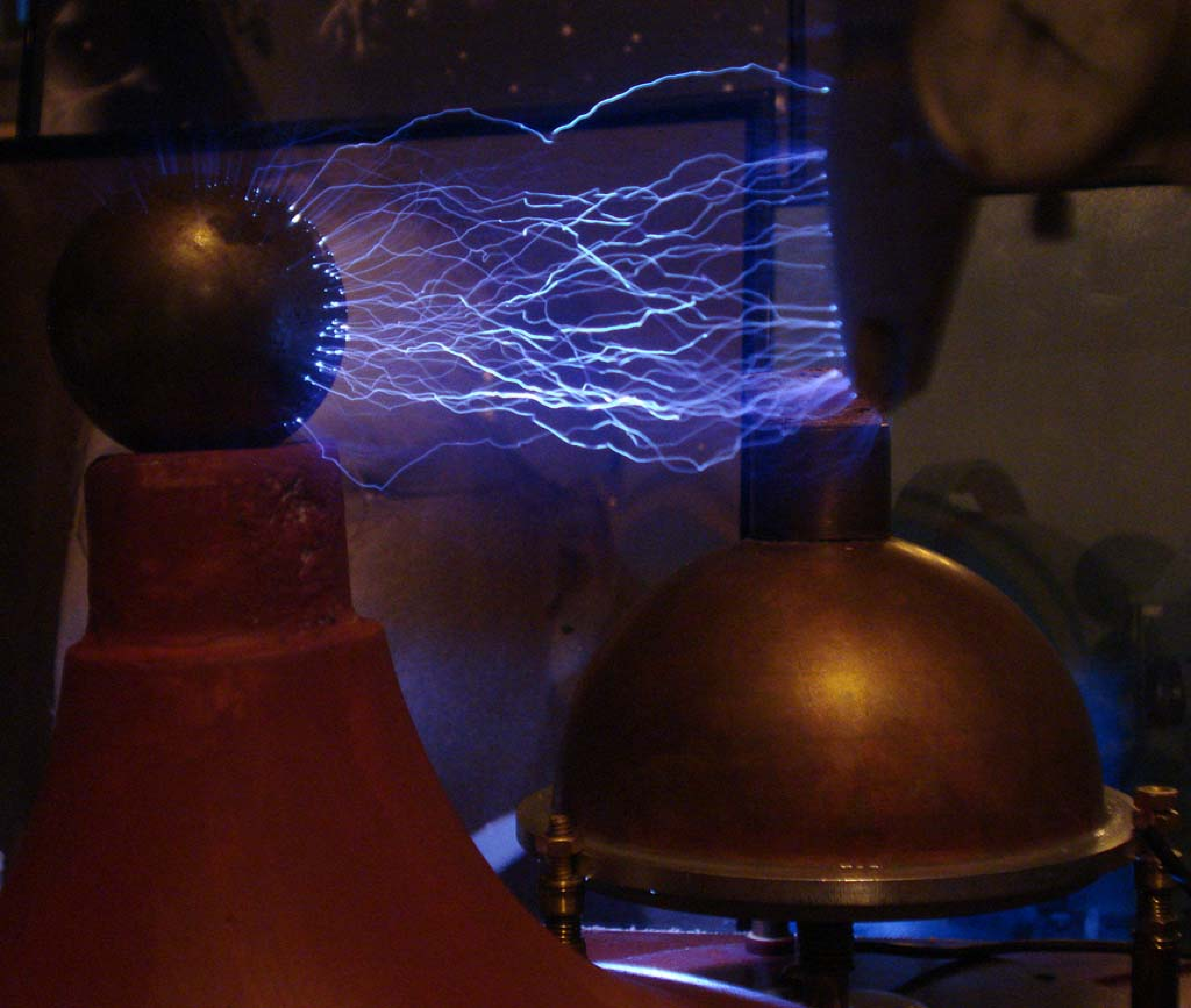

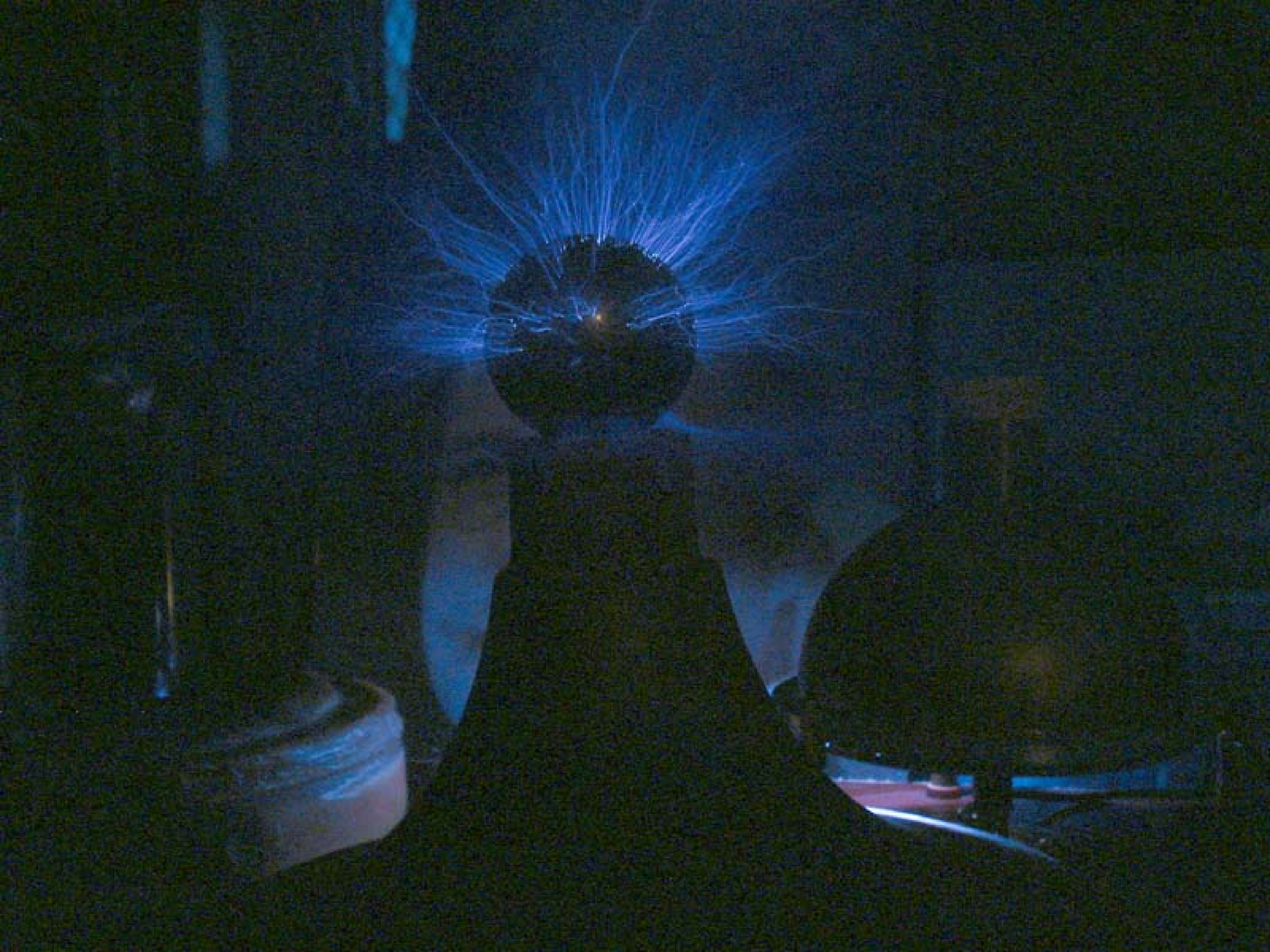

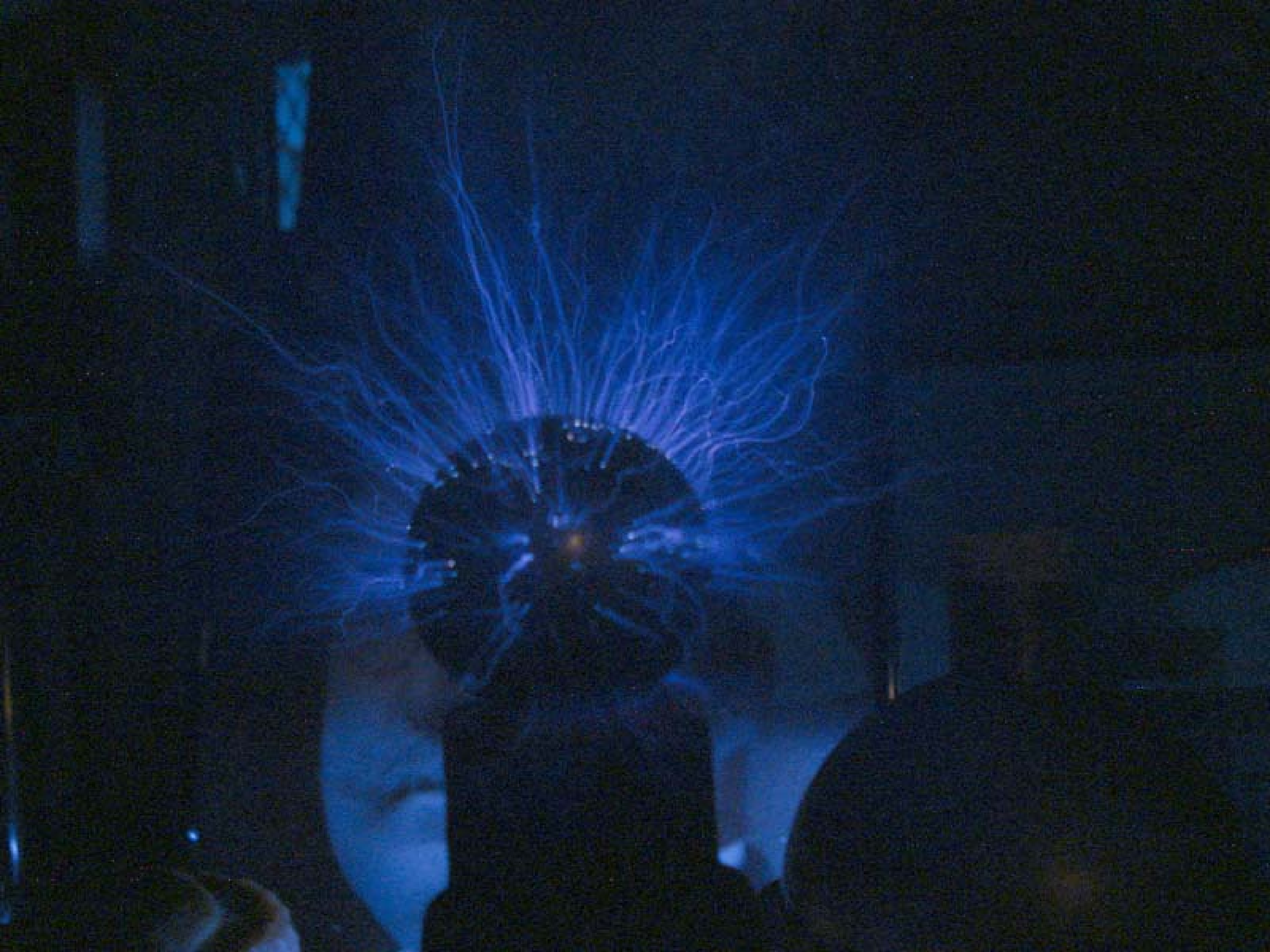

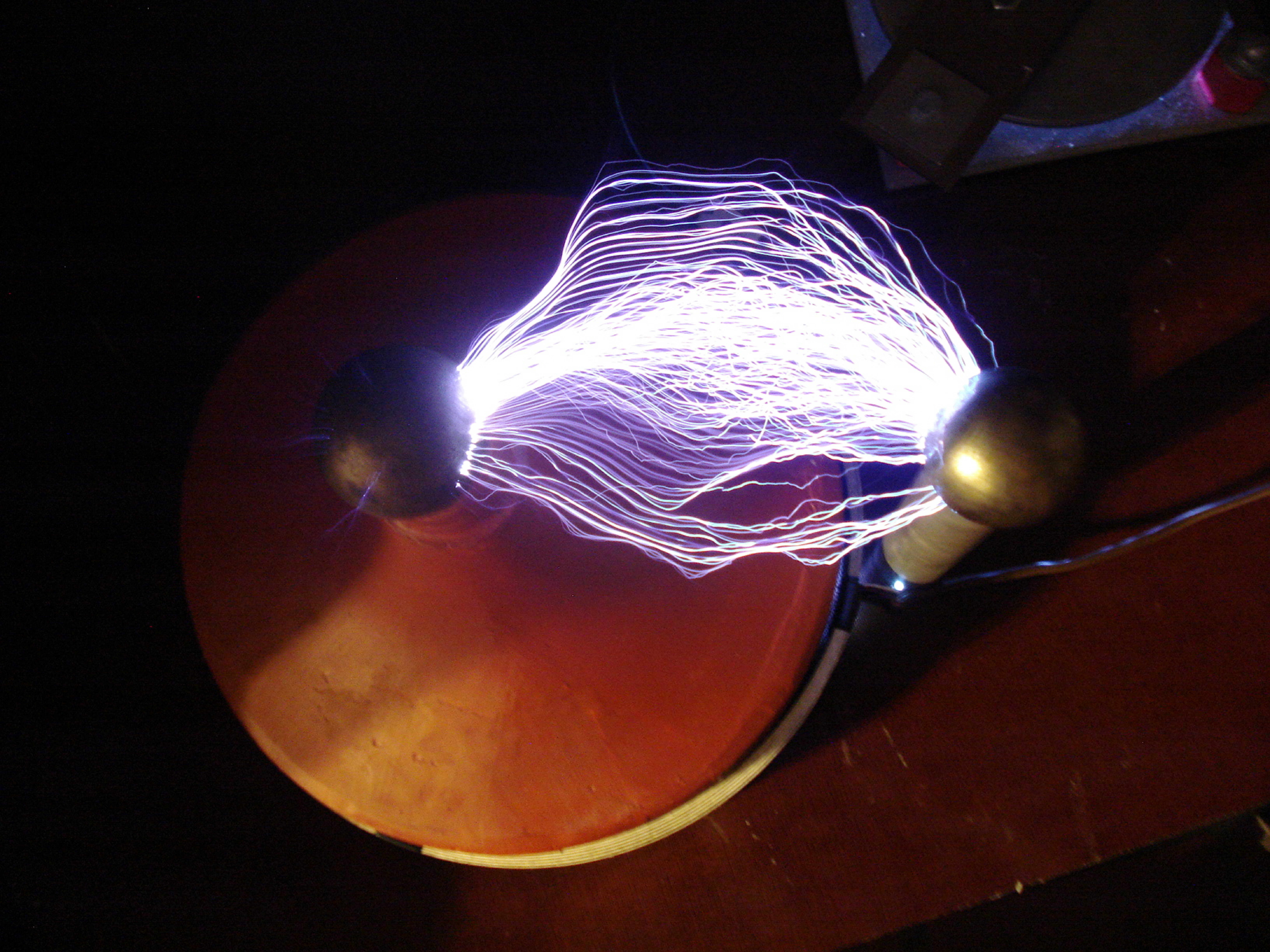

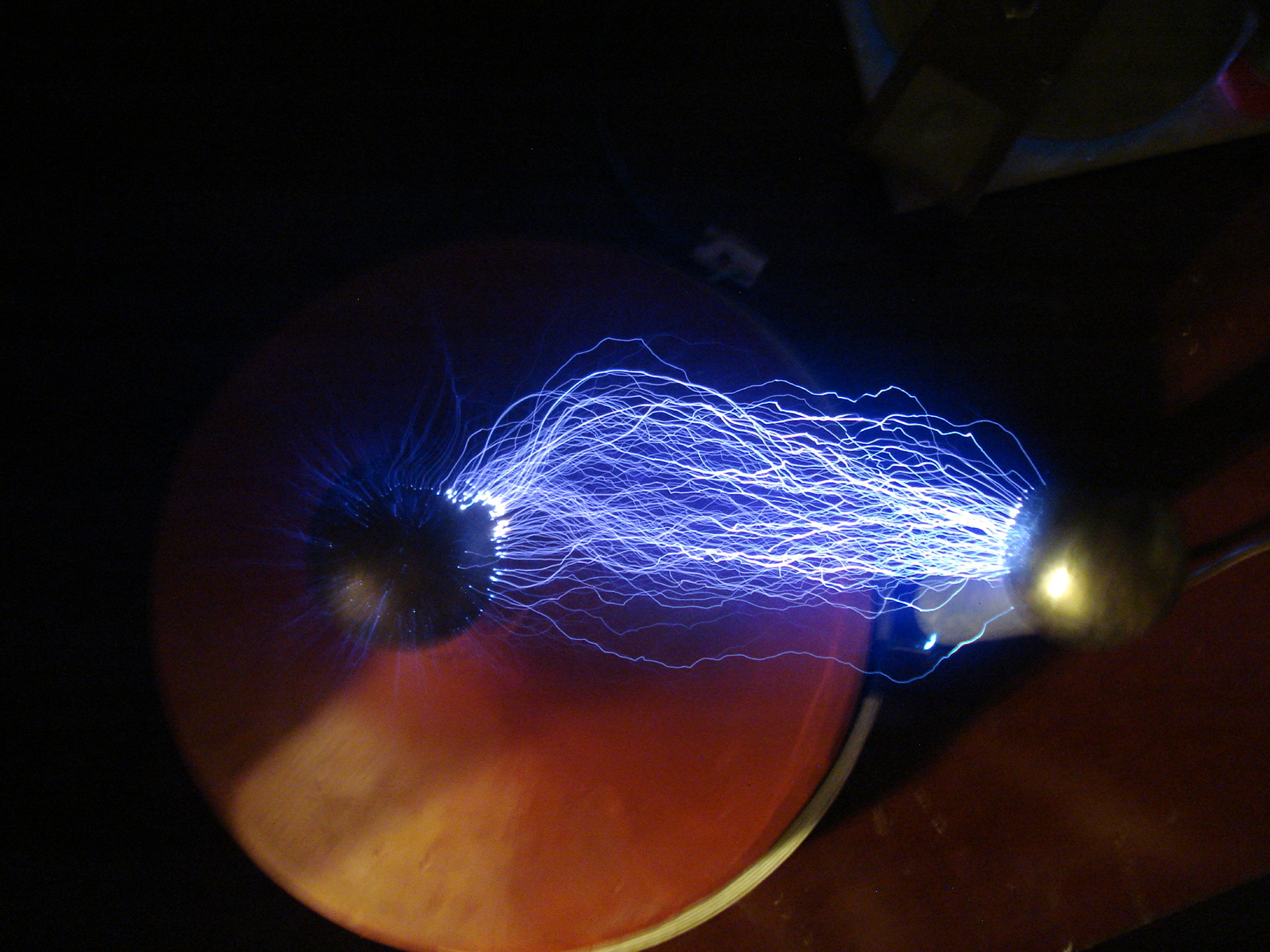

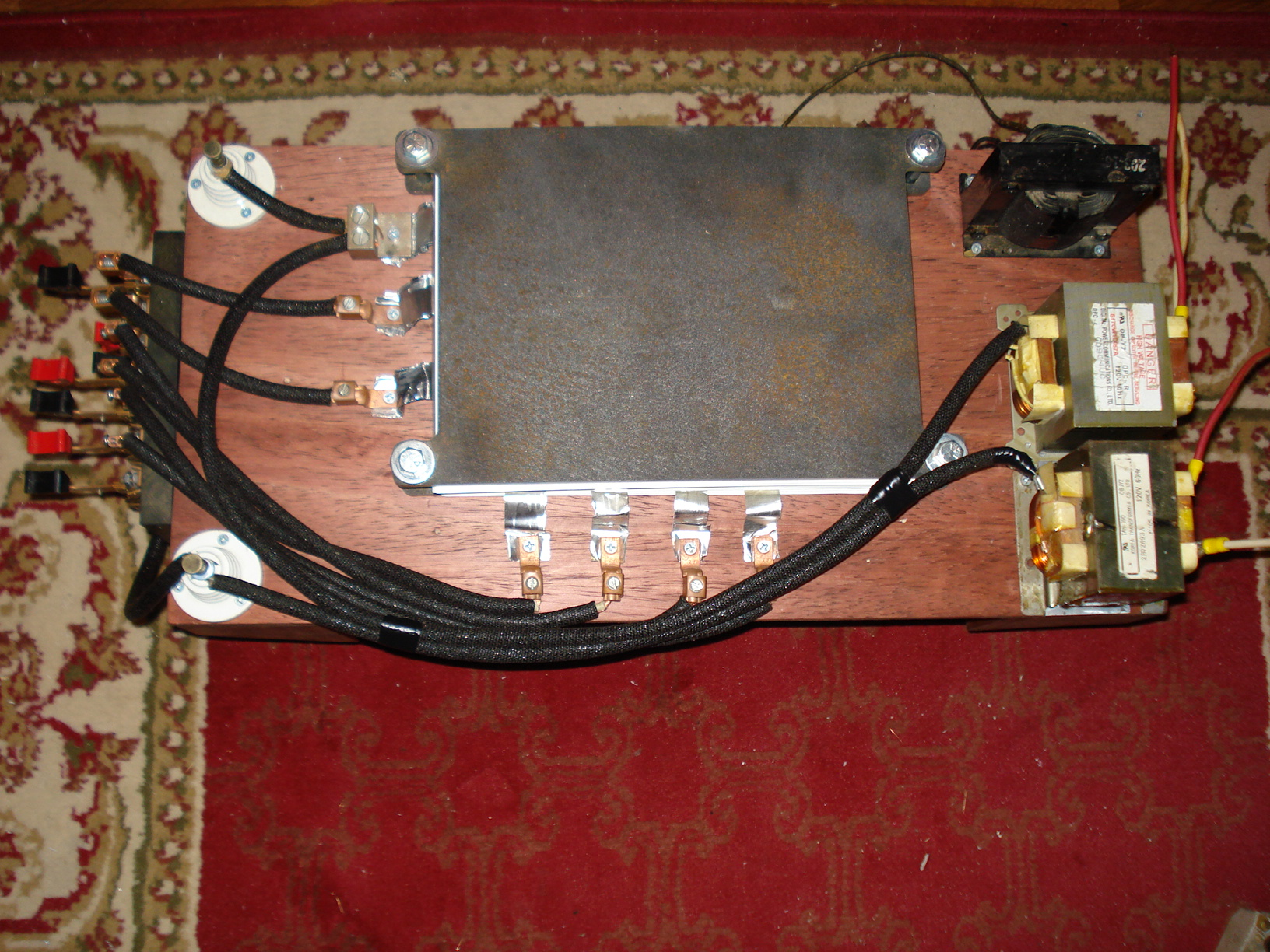
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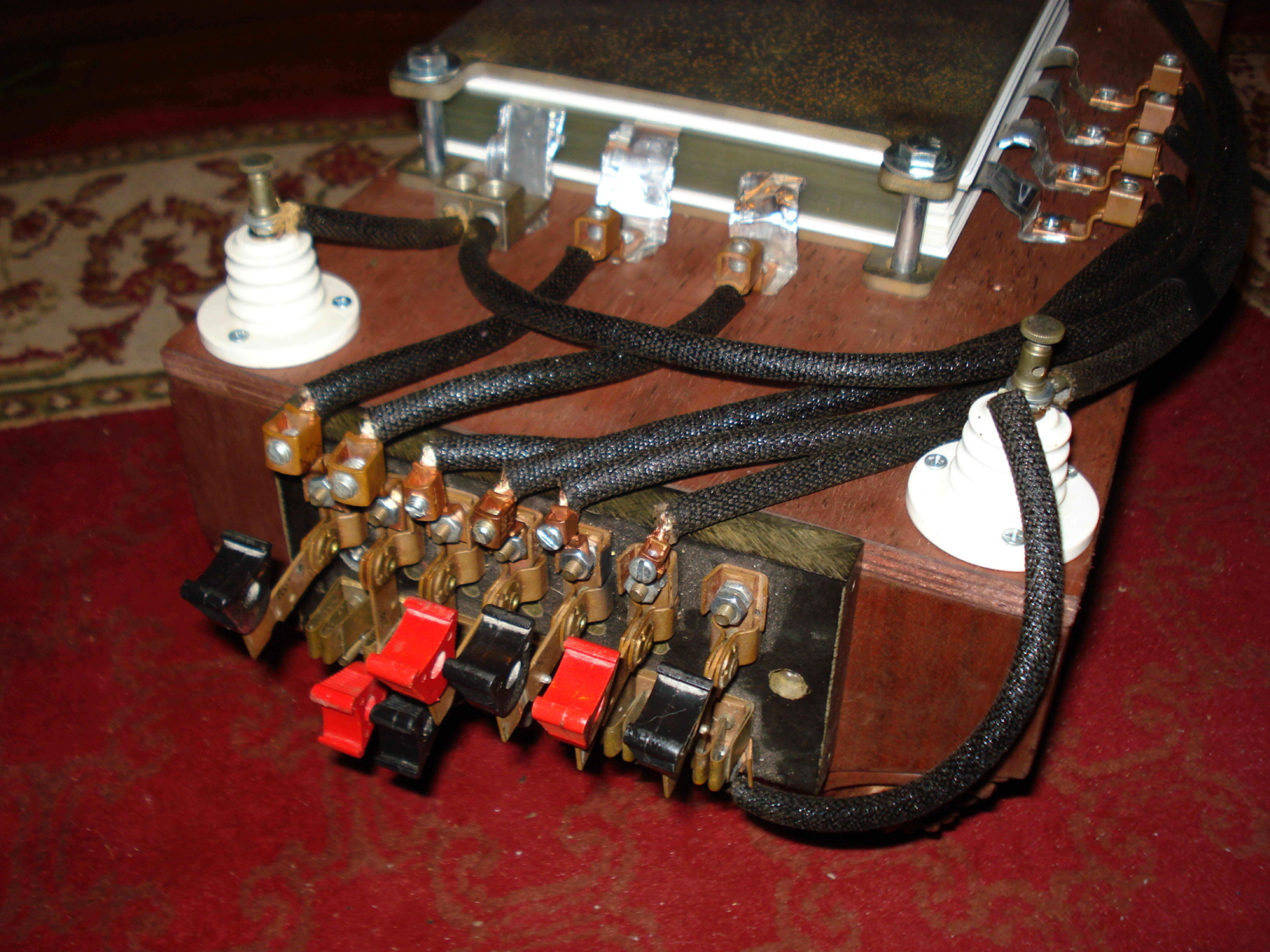

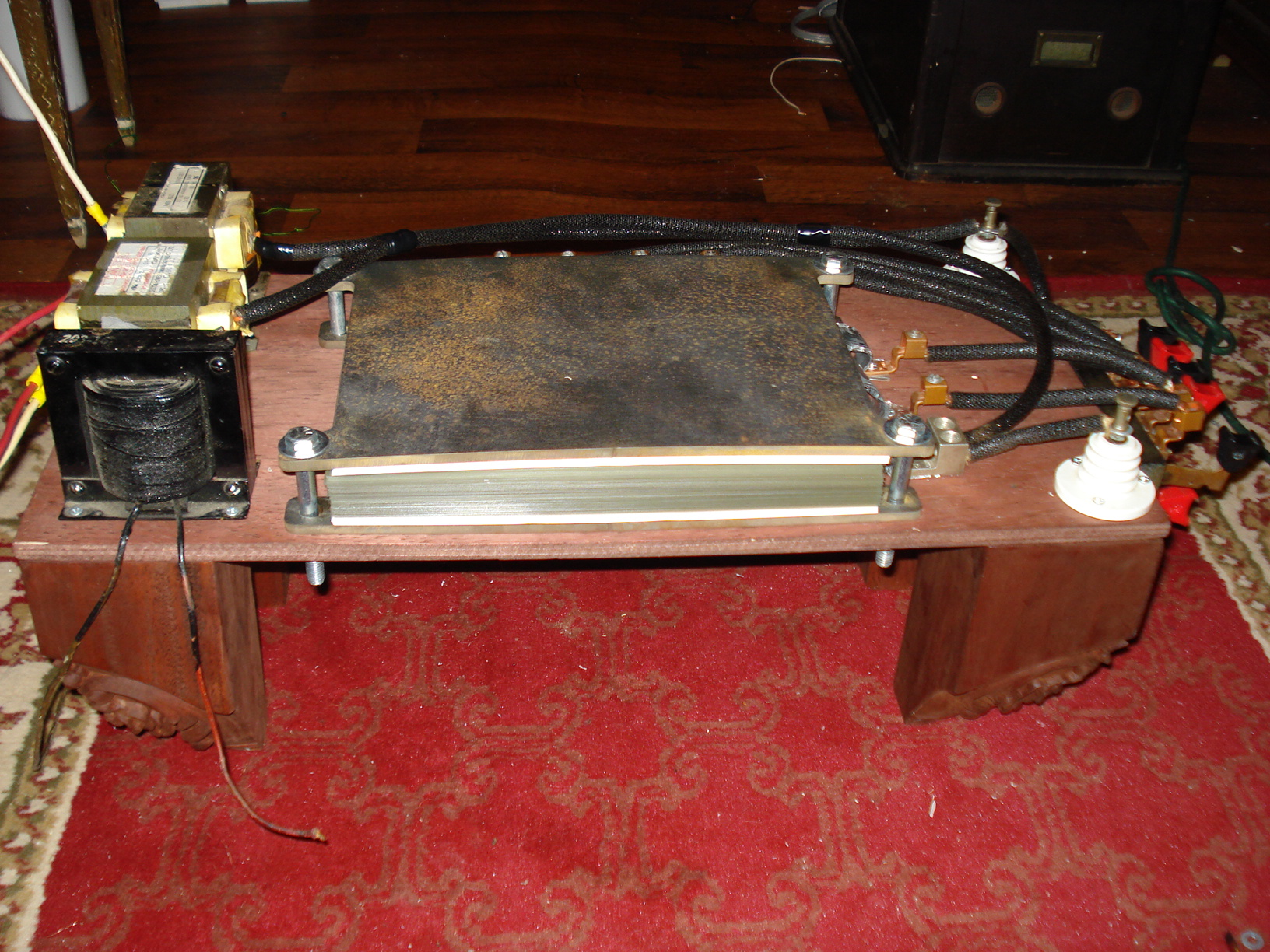

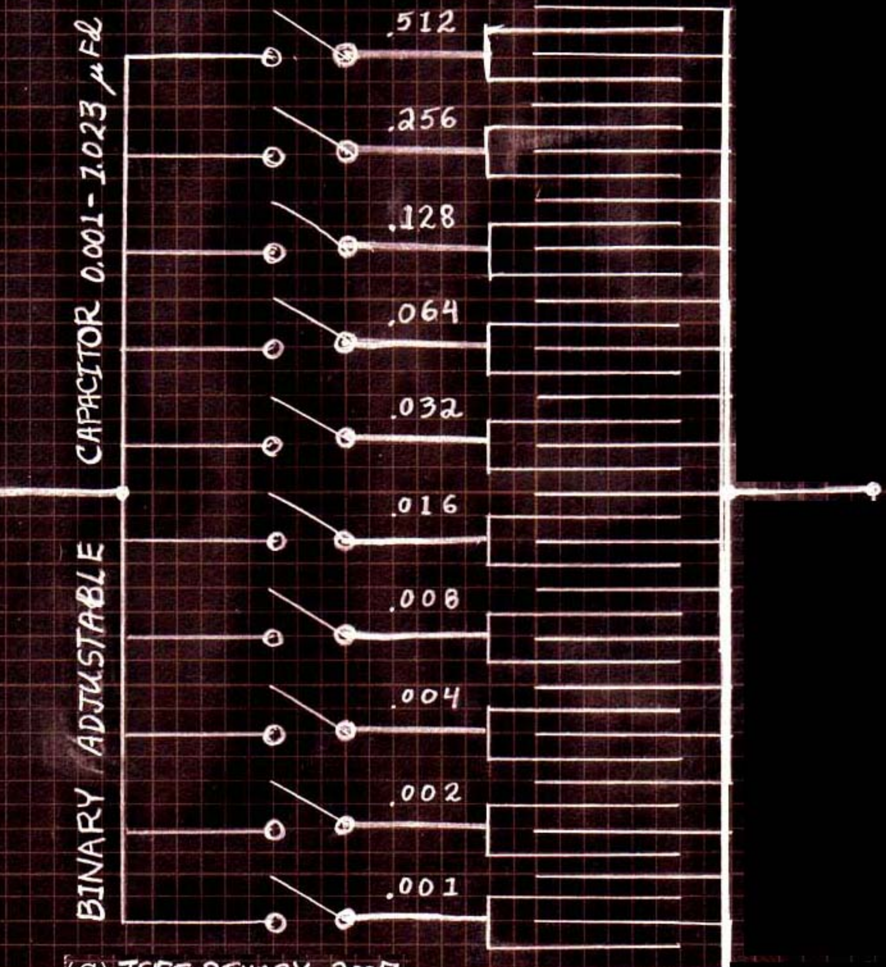
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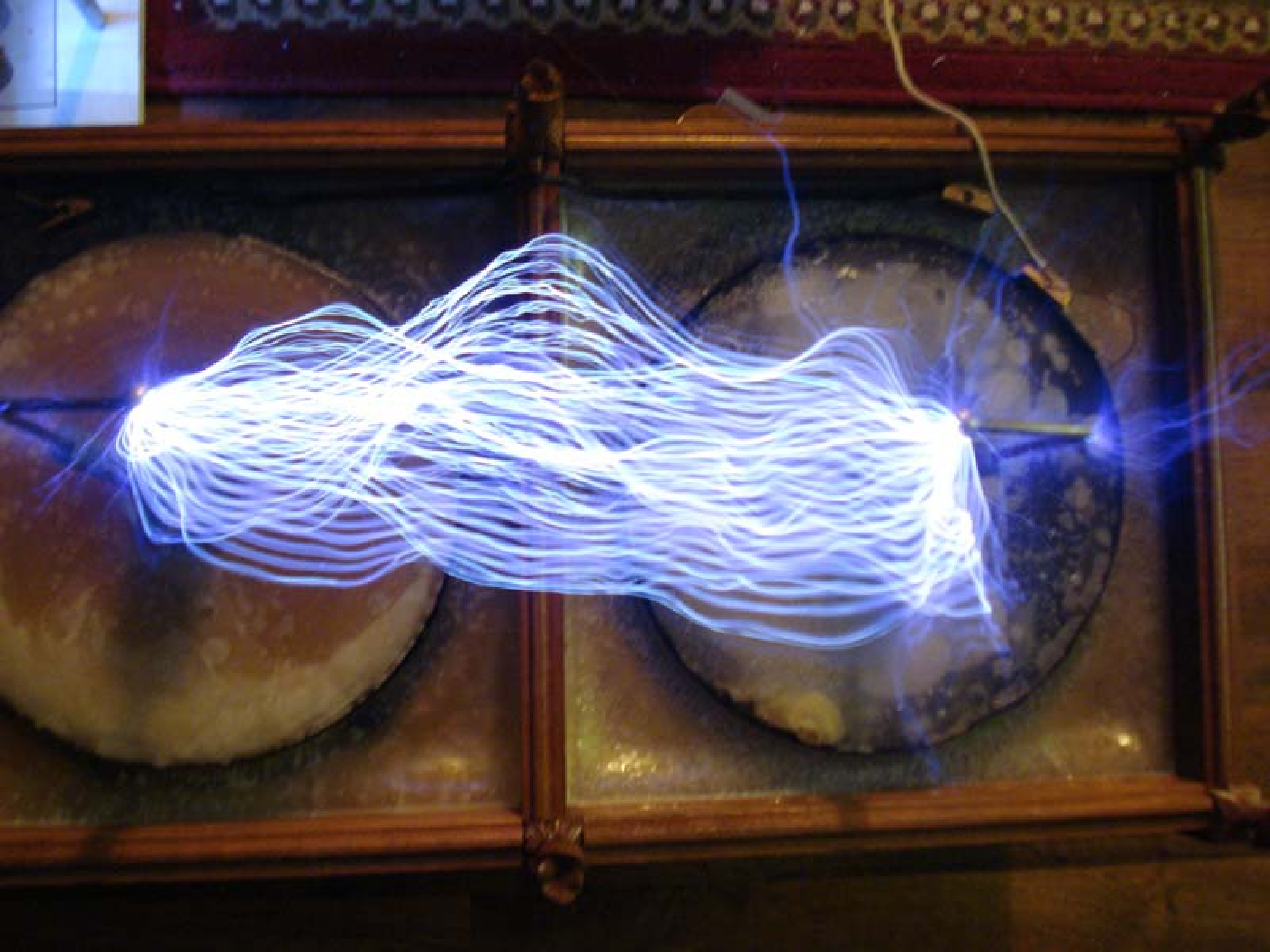
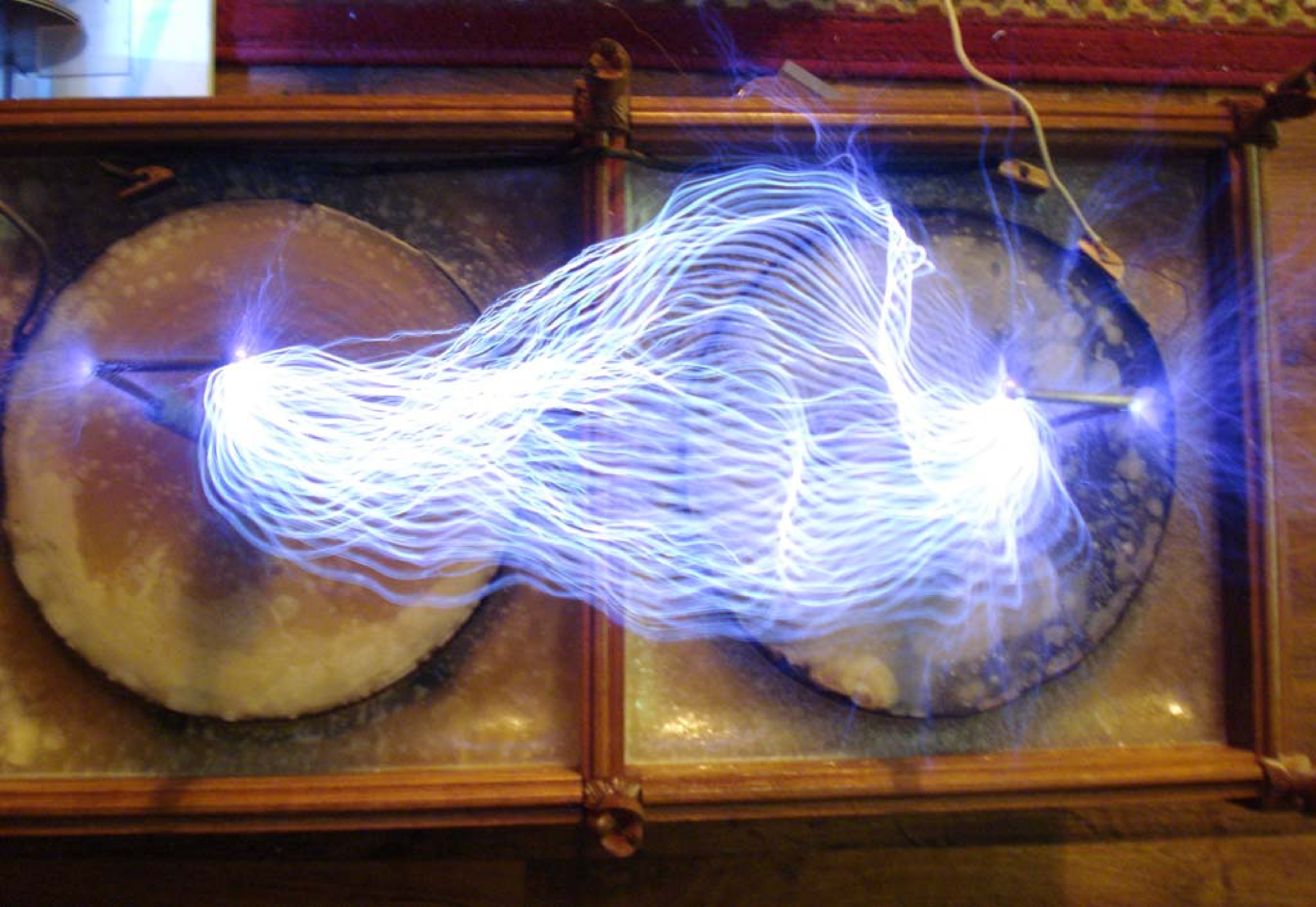
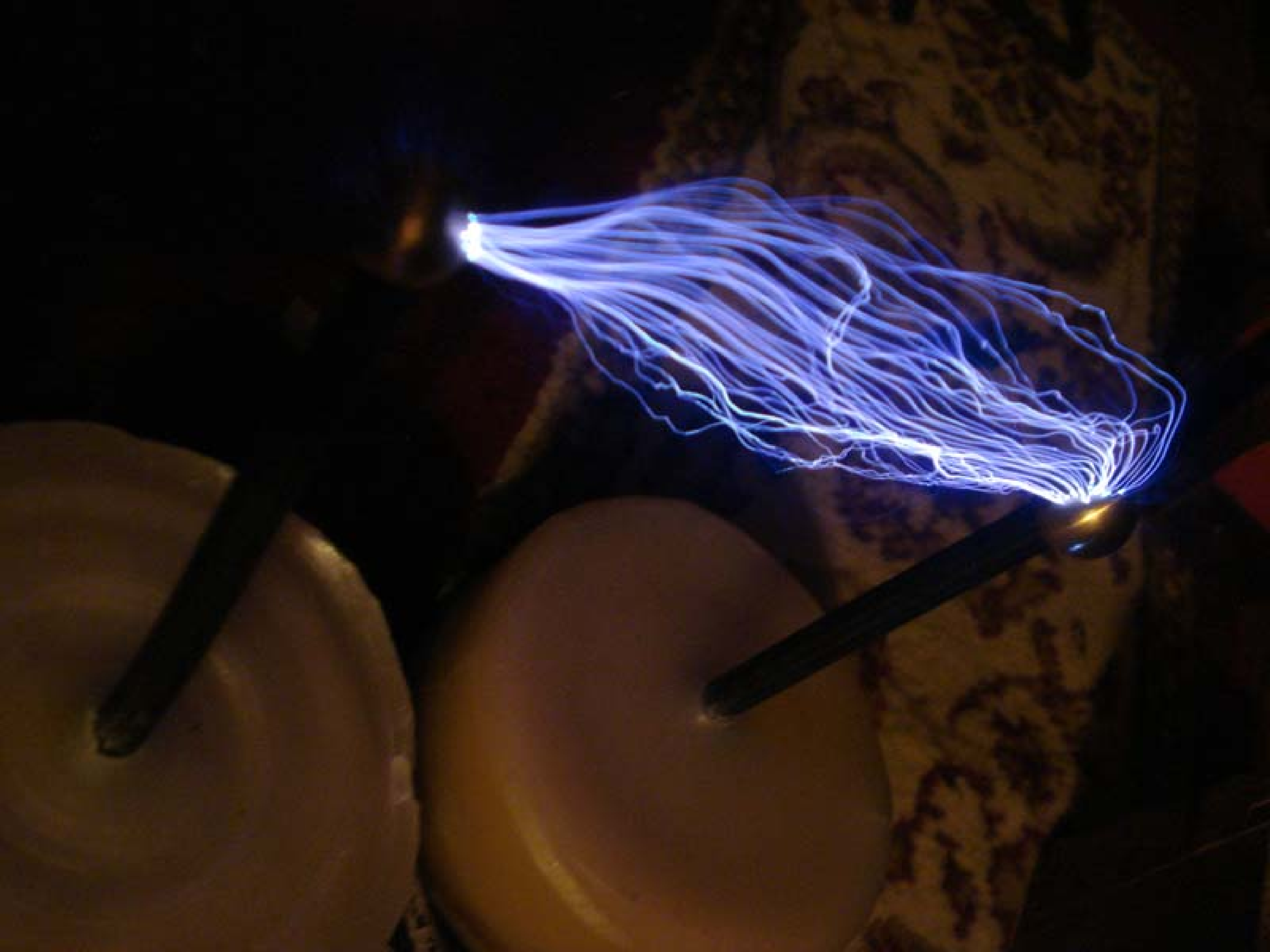
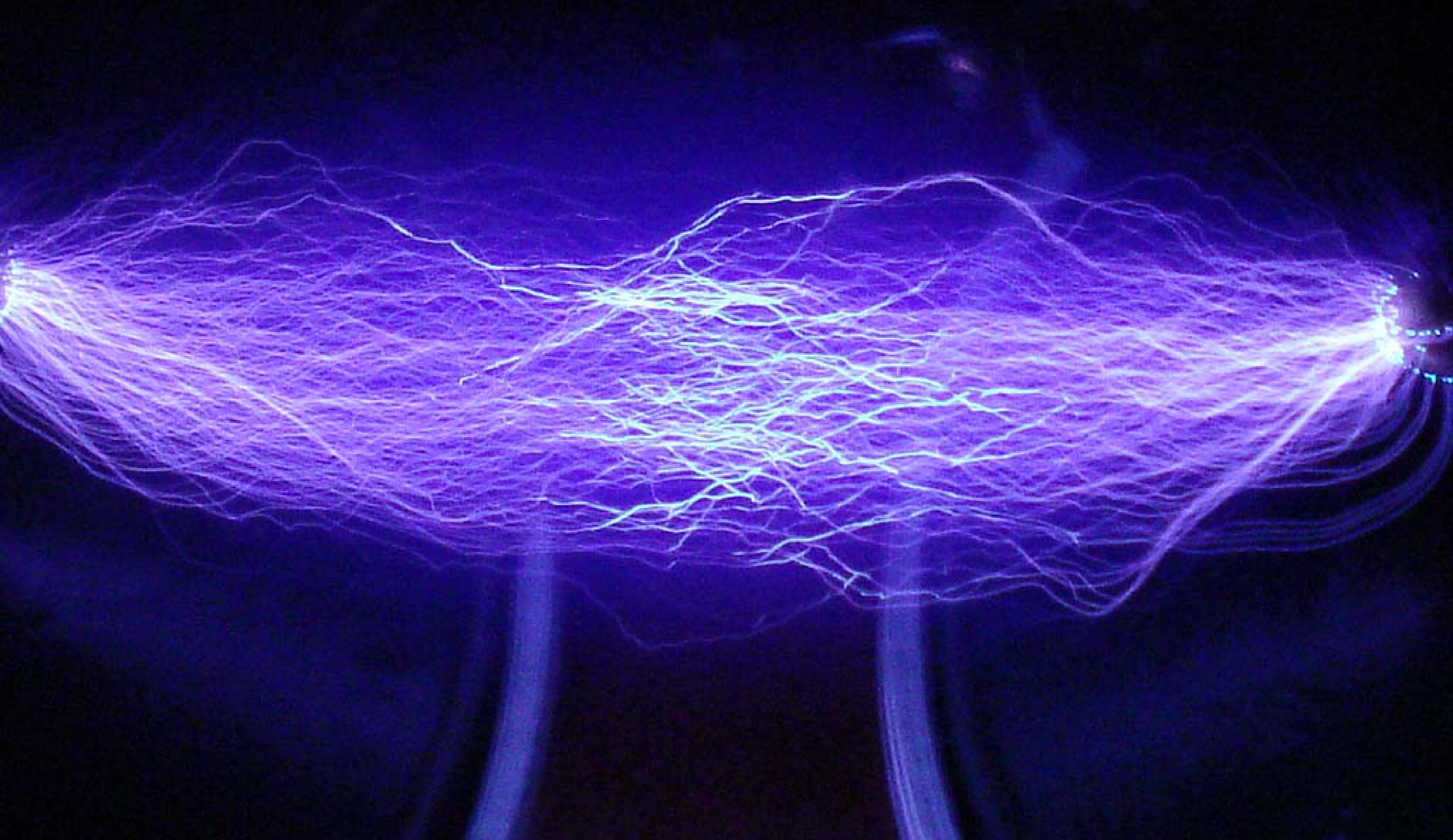
(C) JEFF BEHARY 2007

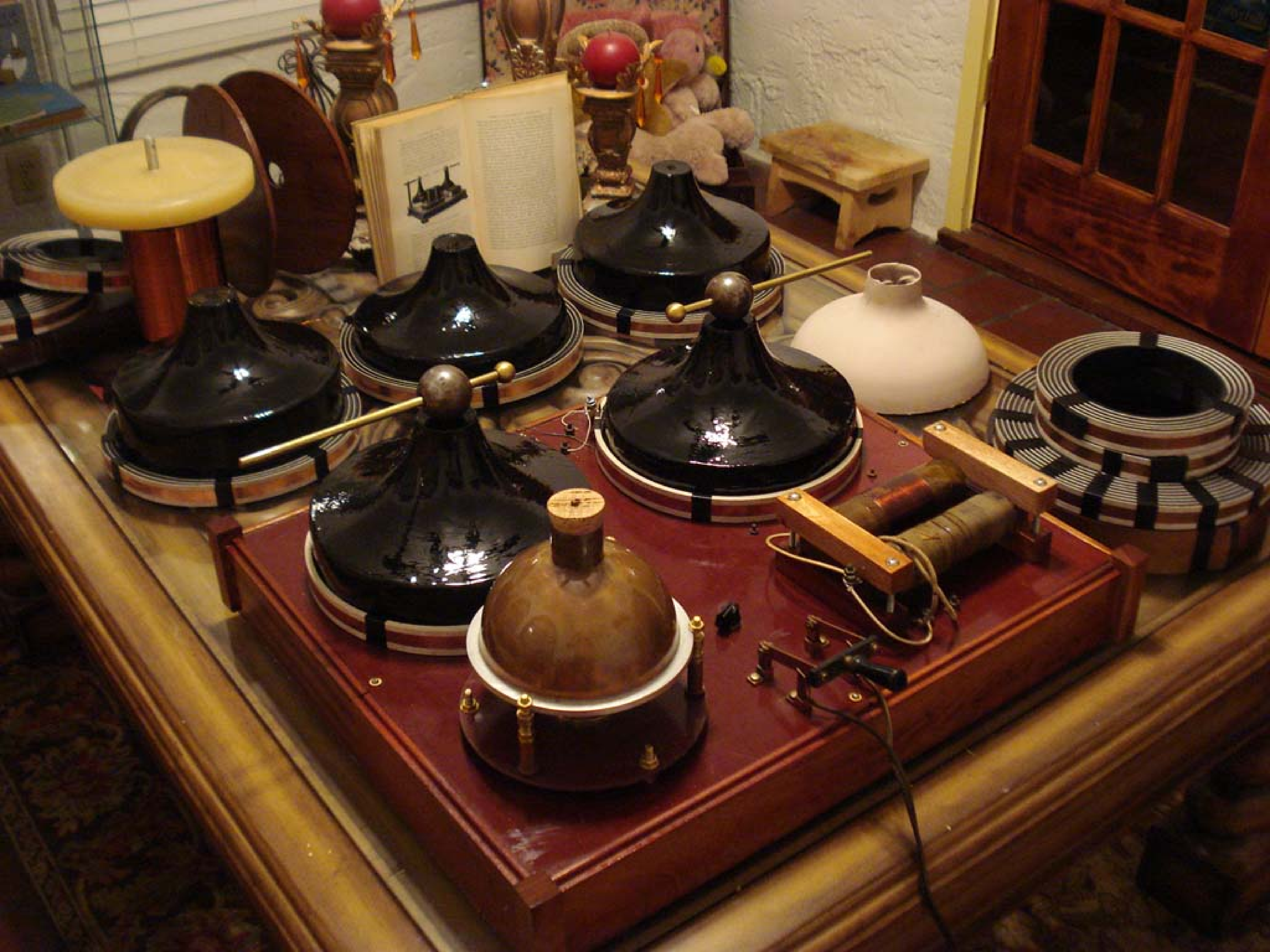


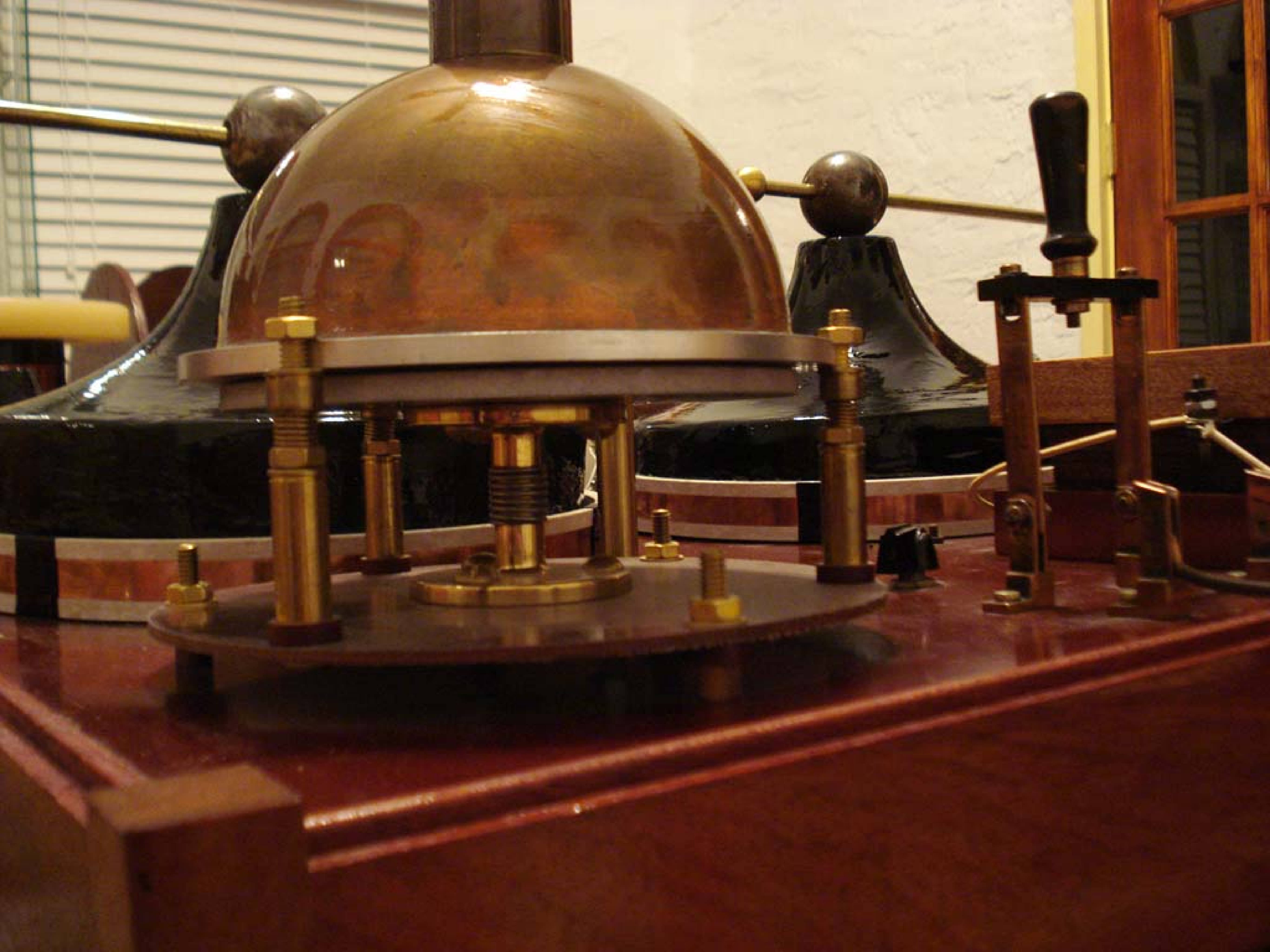


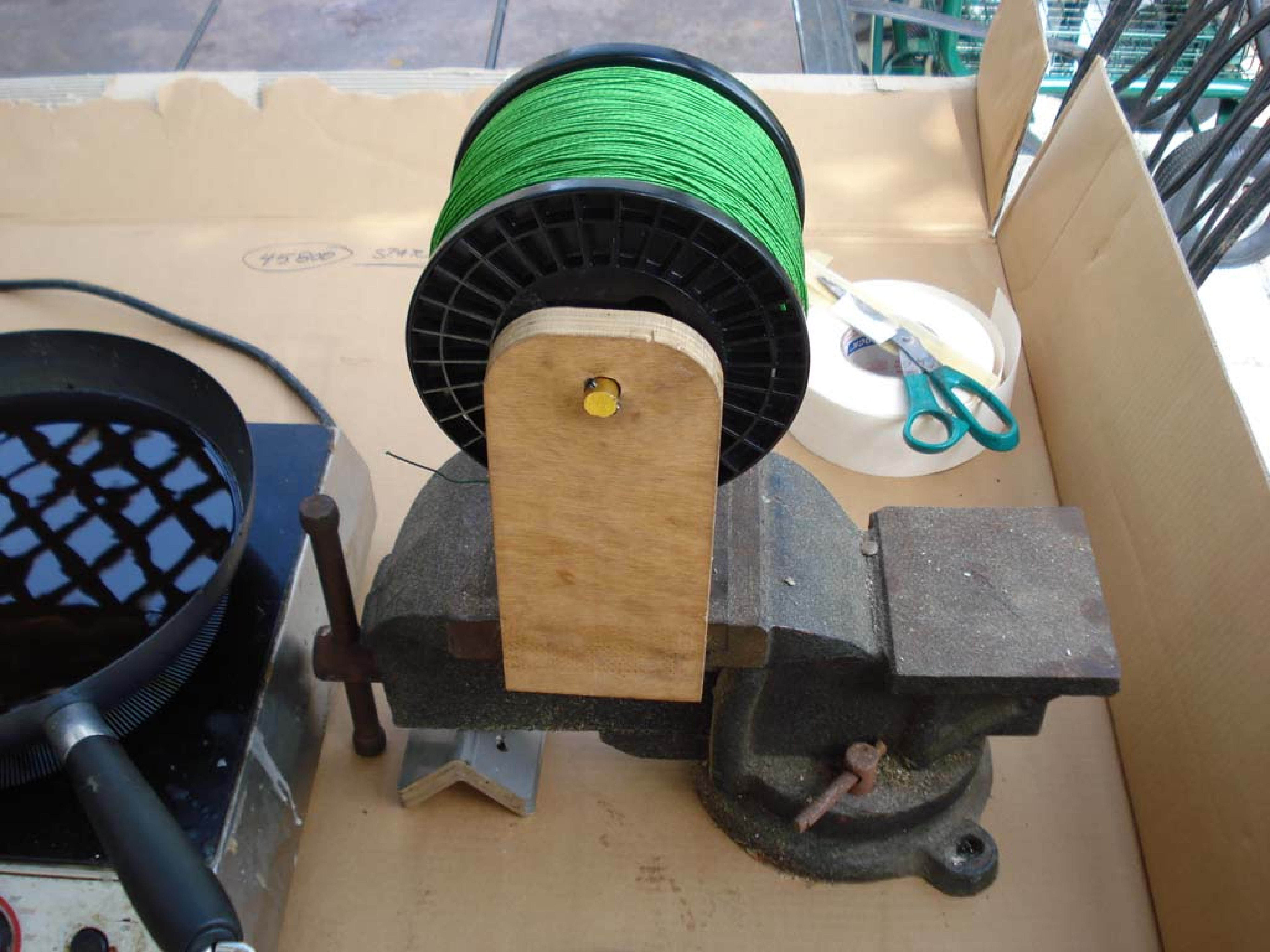




CAT BUTTS
Field Guide



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Mr. Induction
Cooktop II
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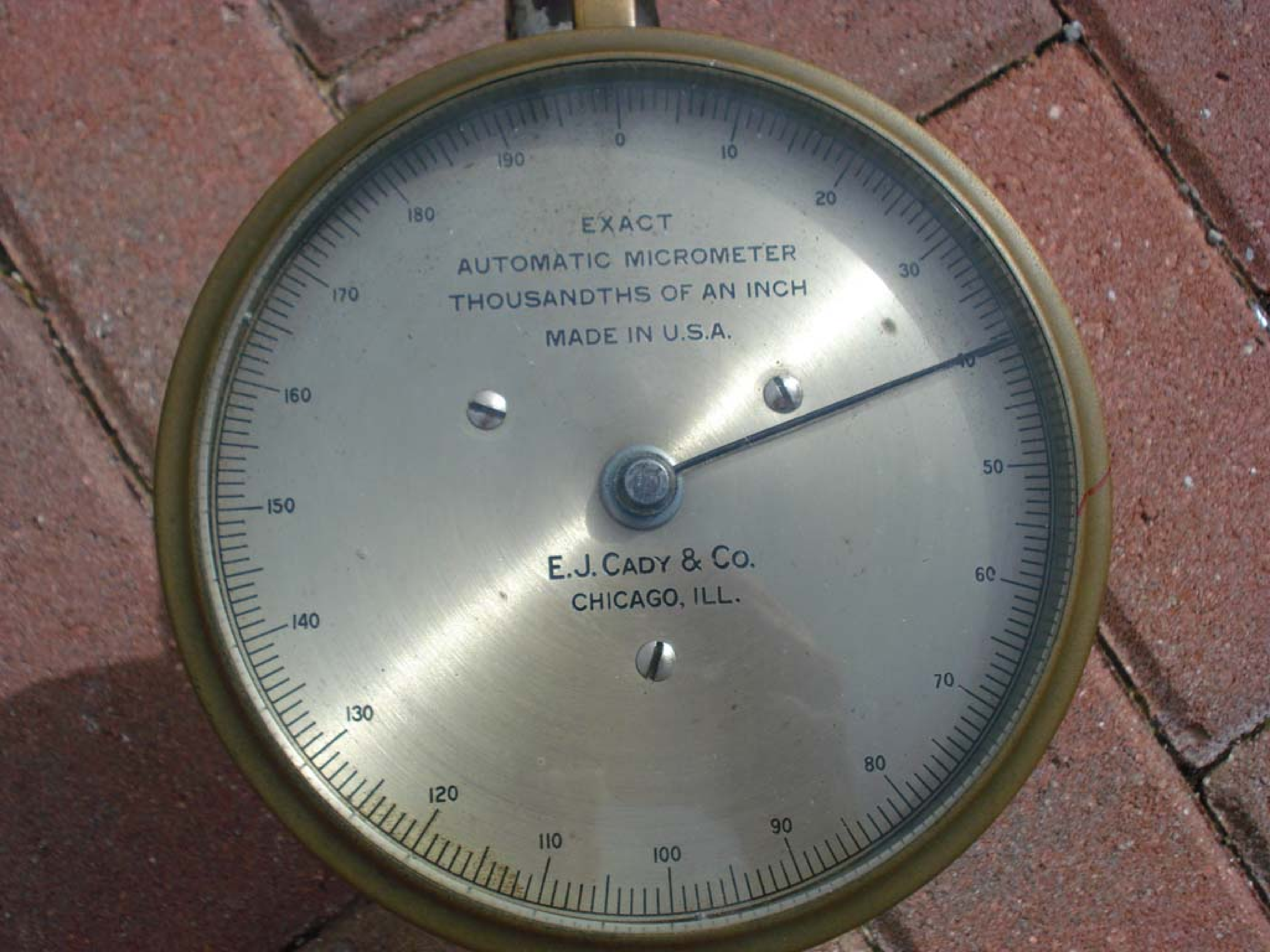
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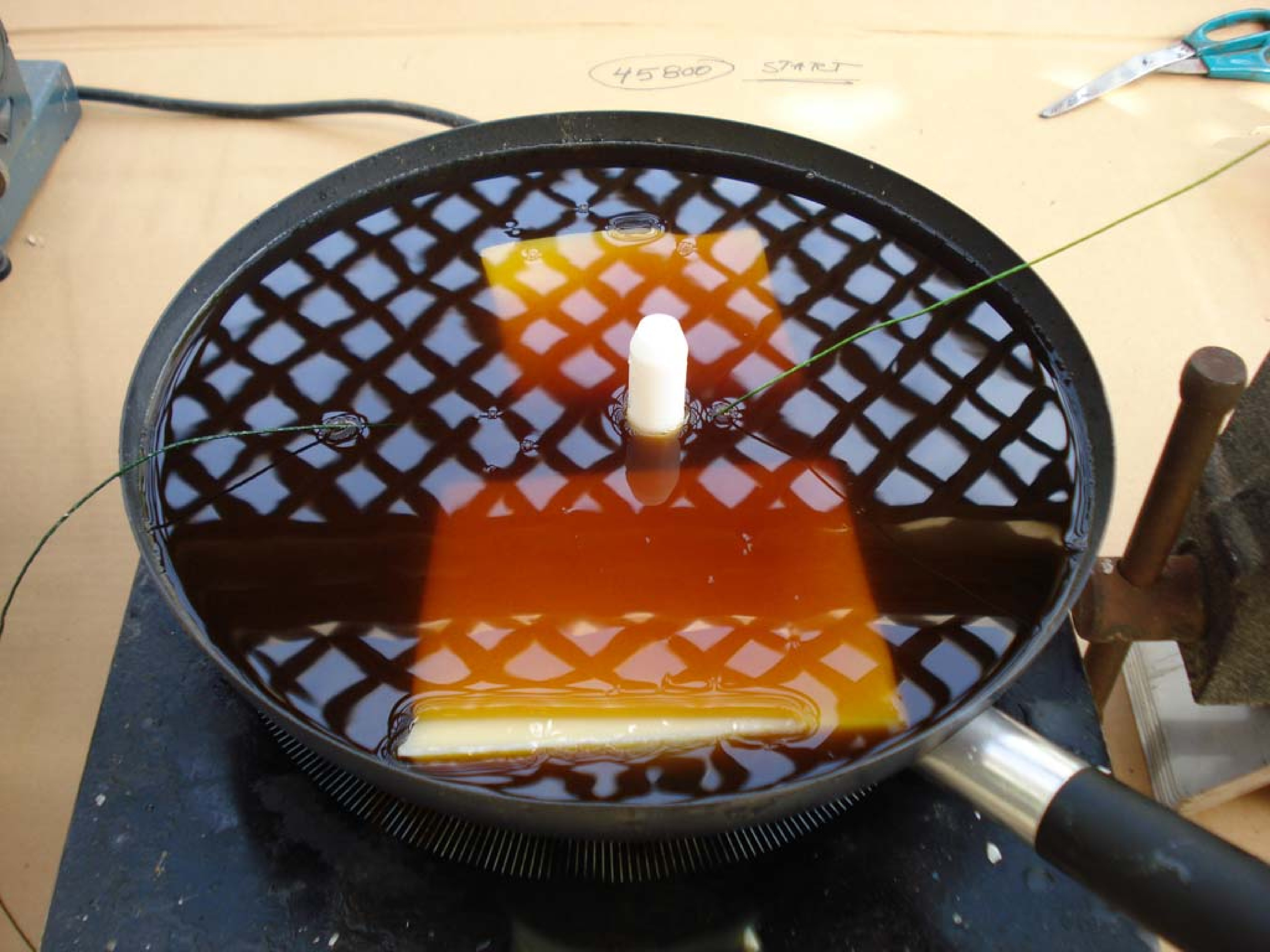
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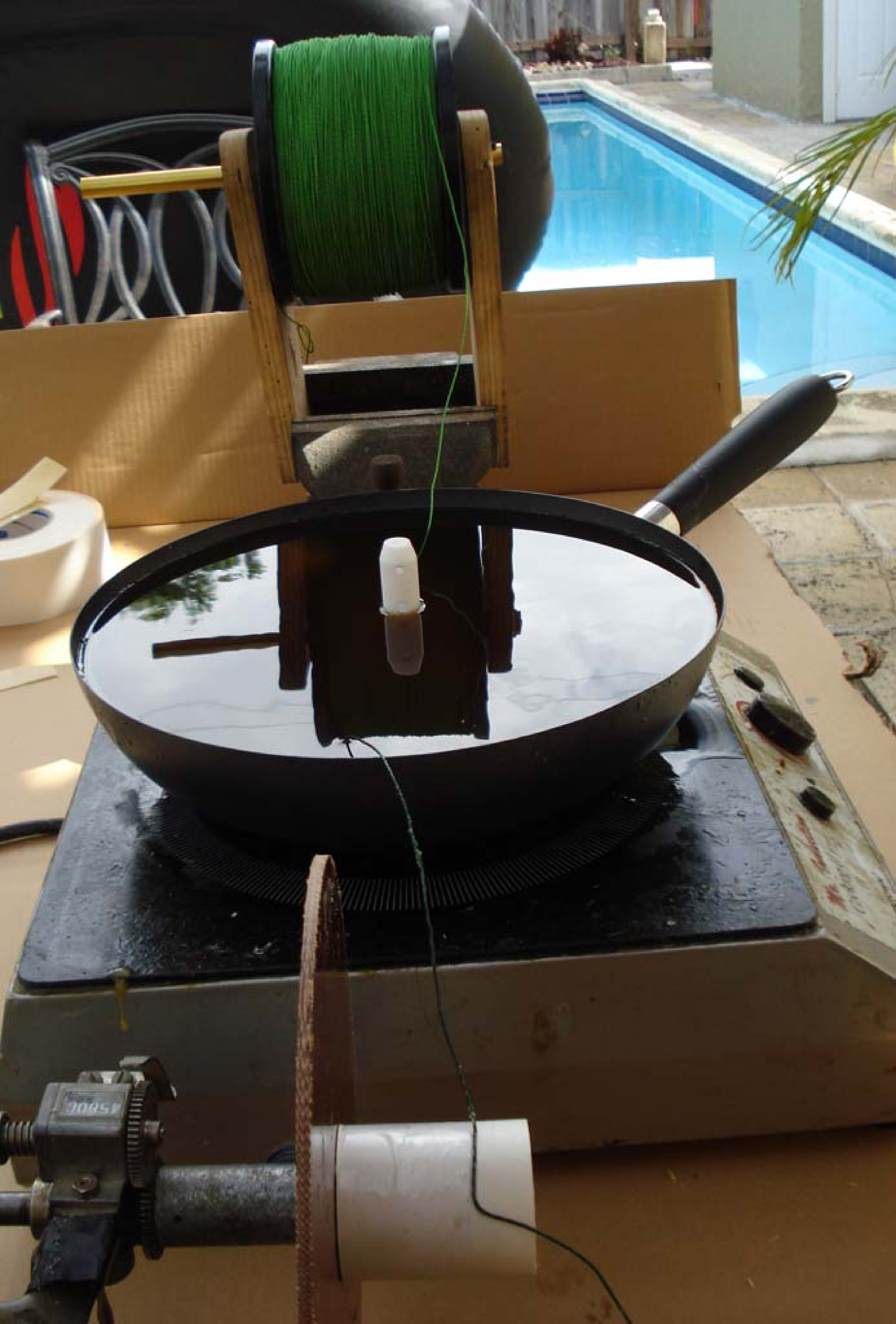
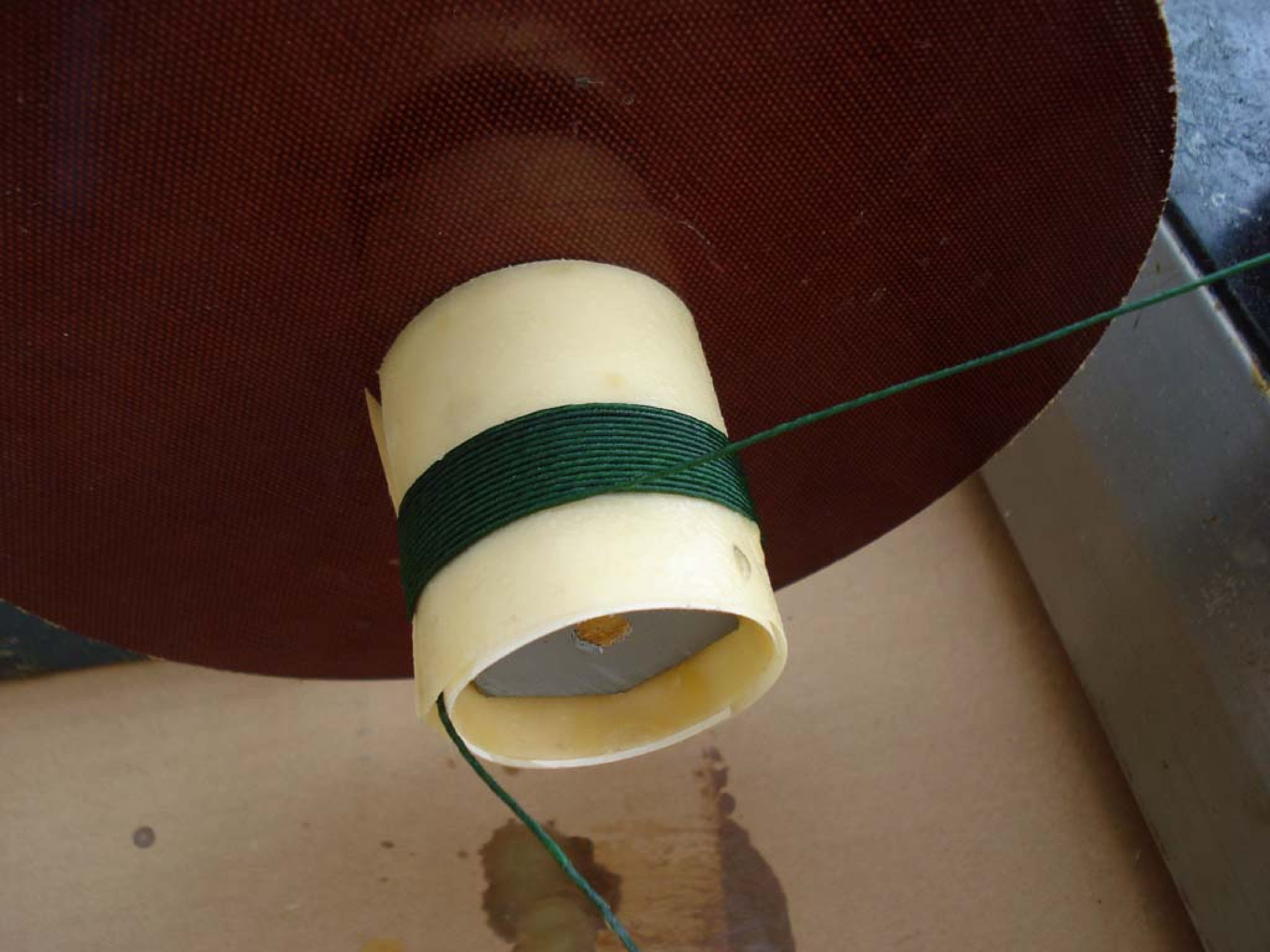
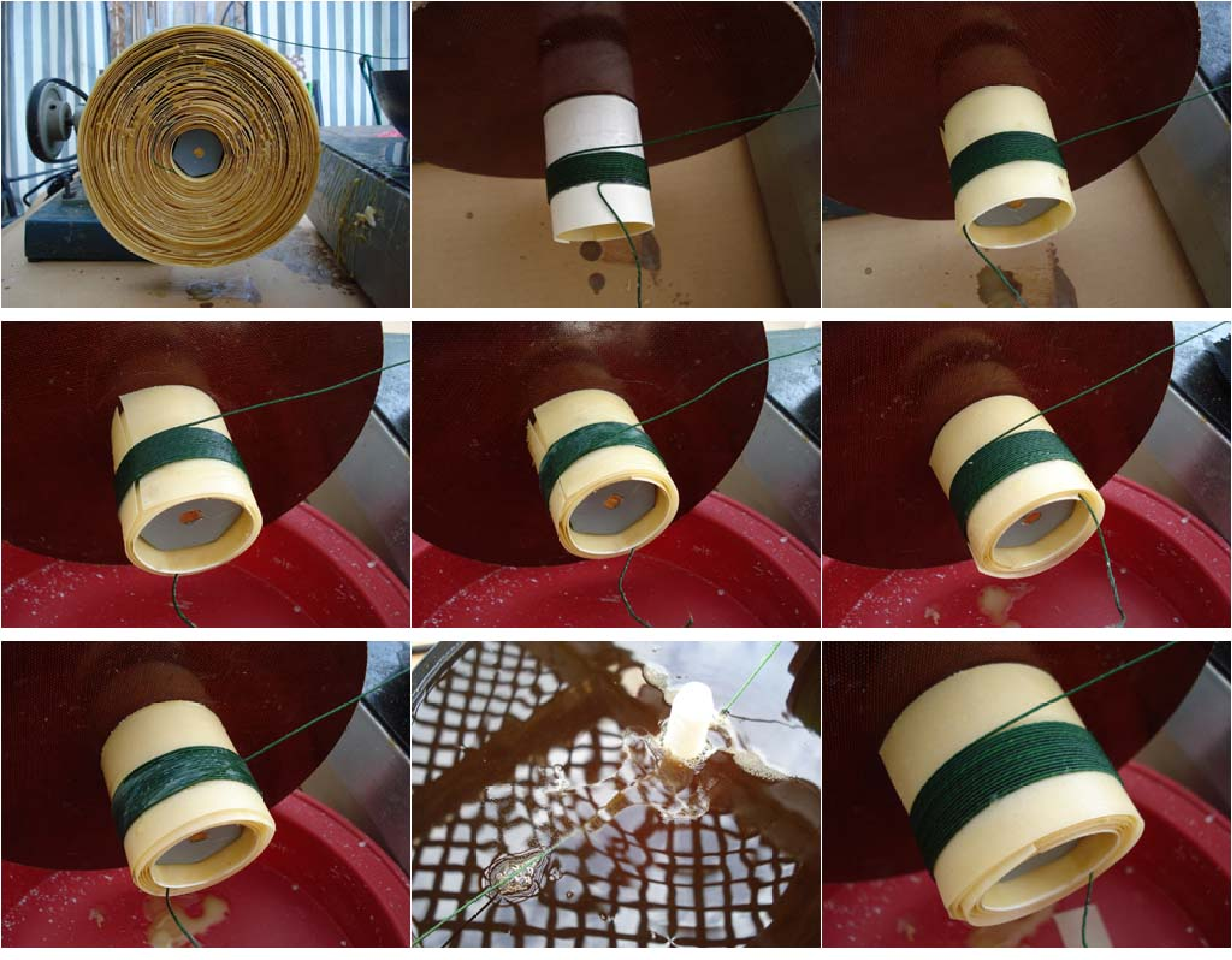
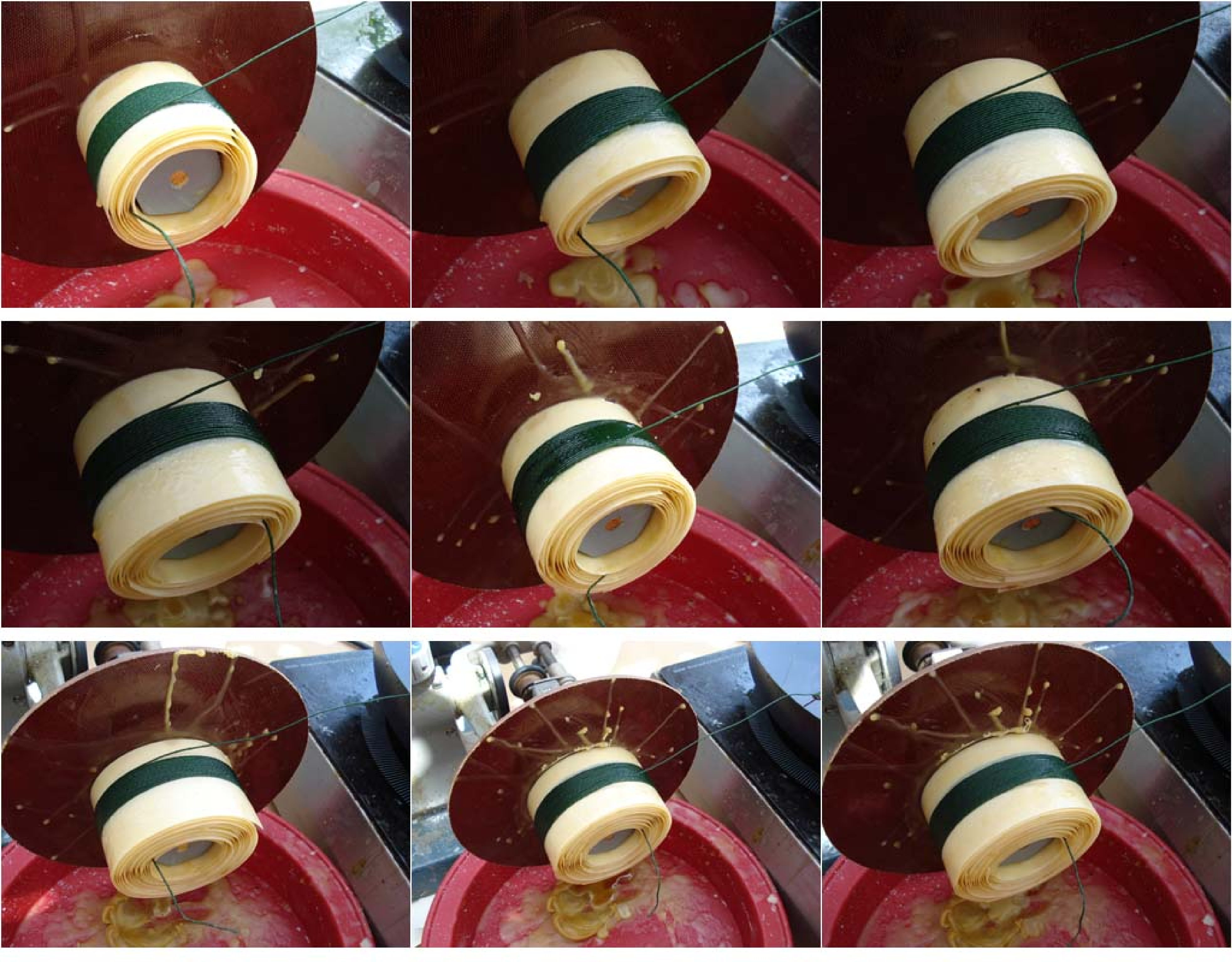
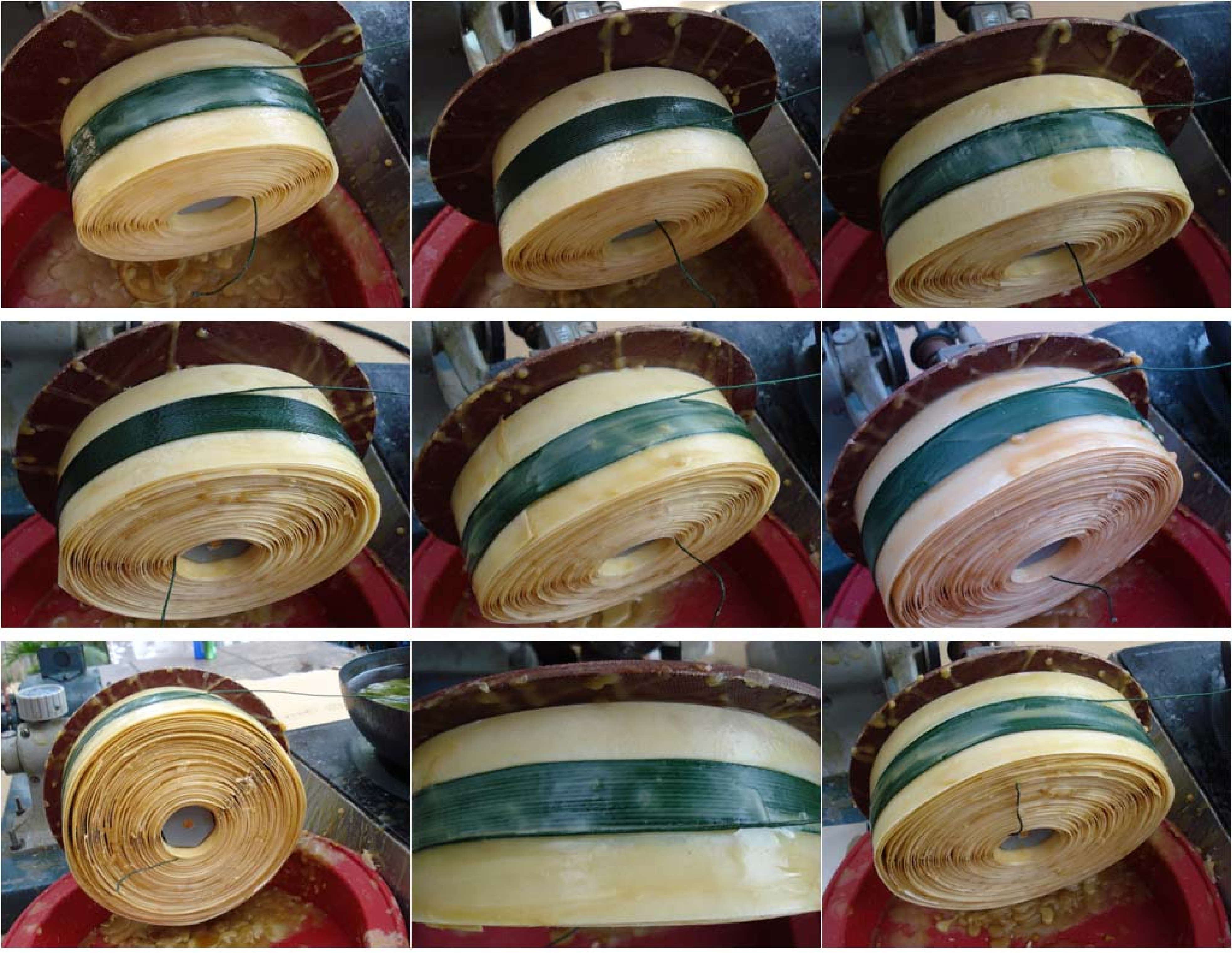
Mr. Induction
Cooktop II

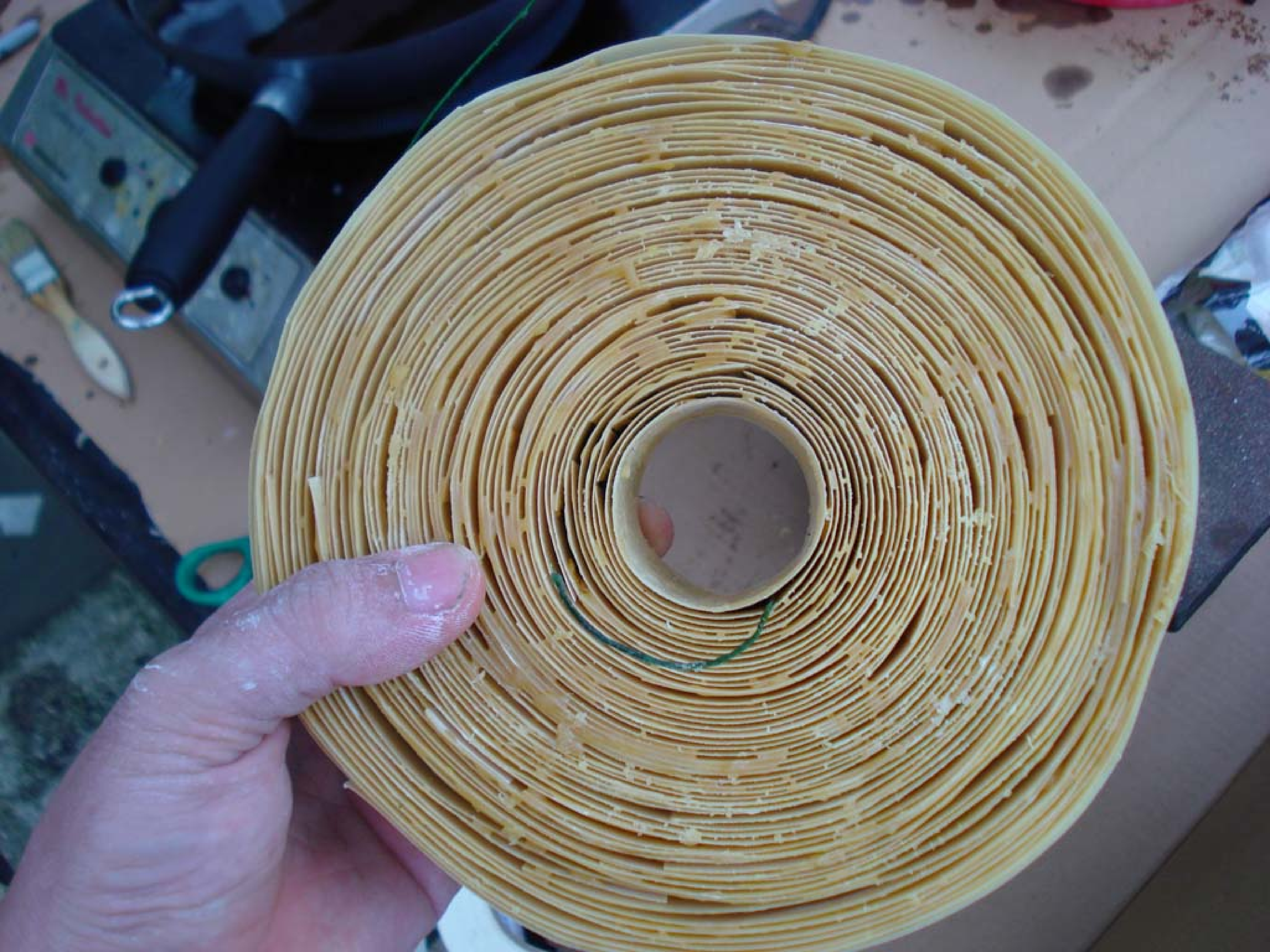


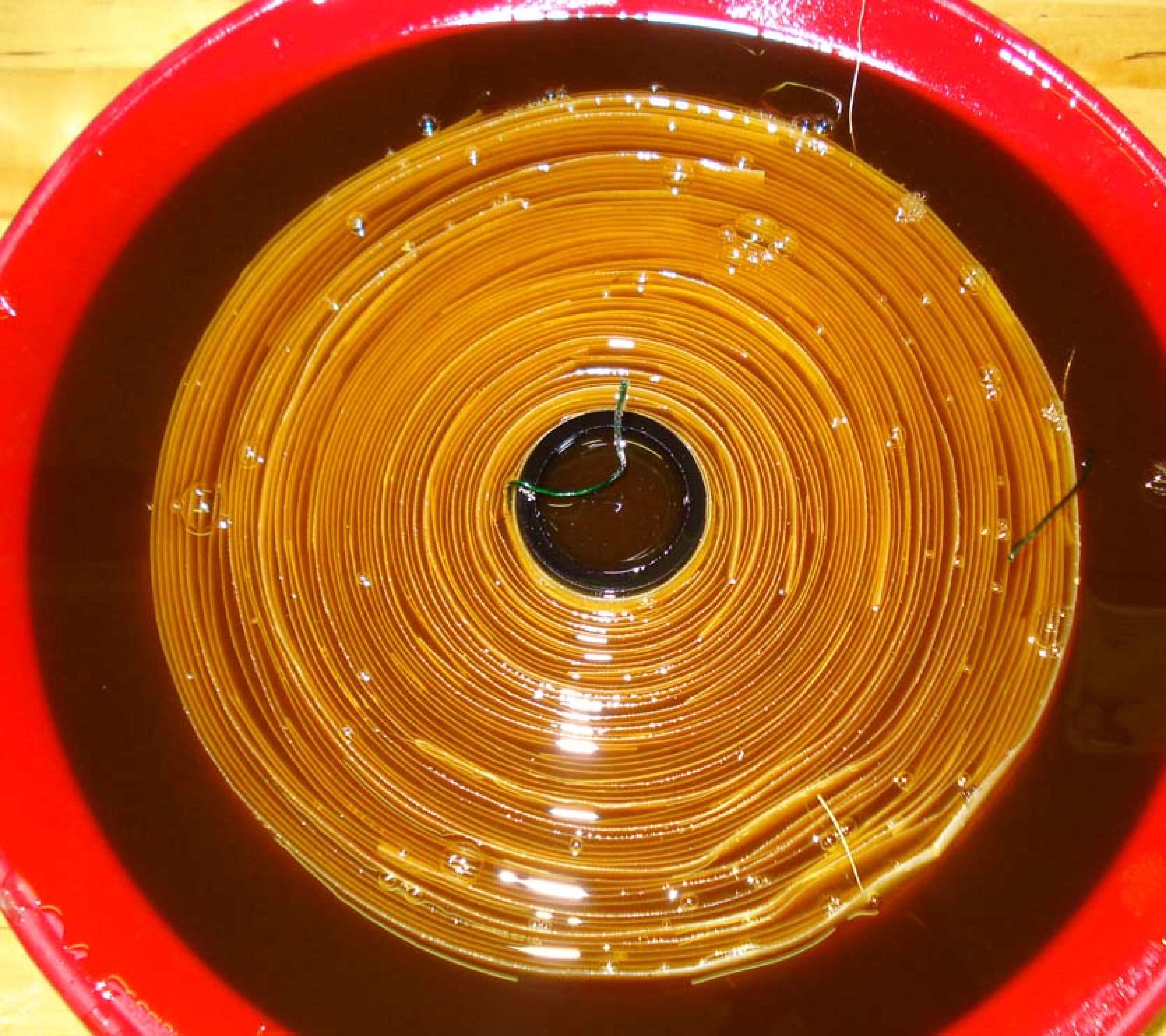


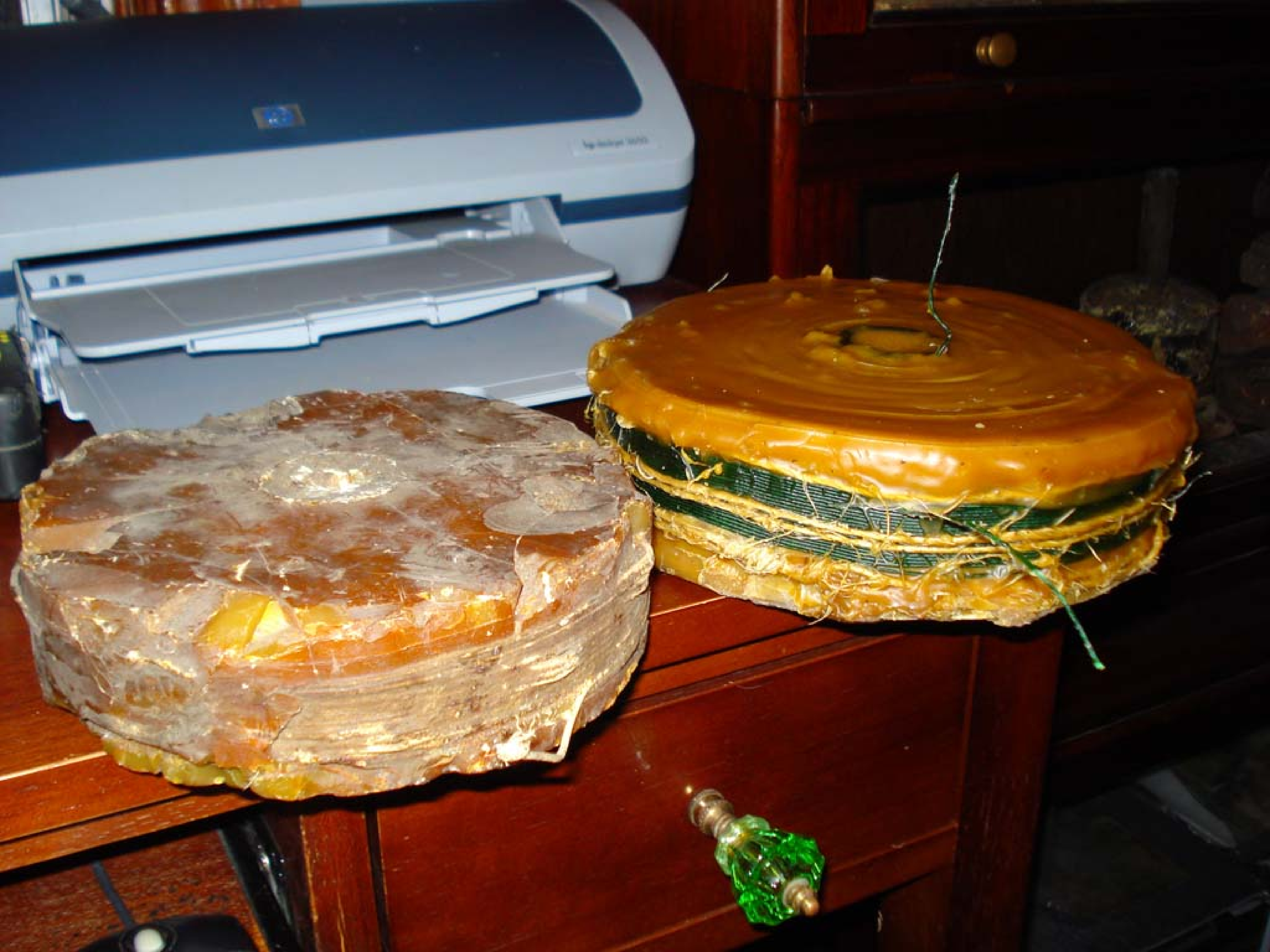


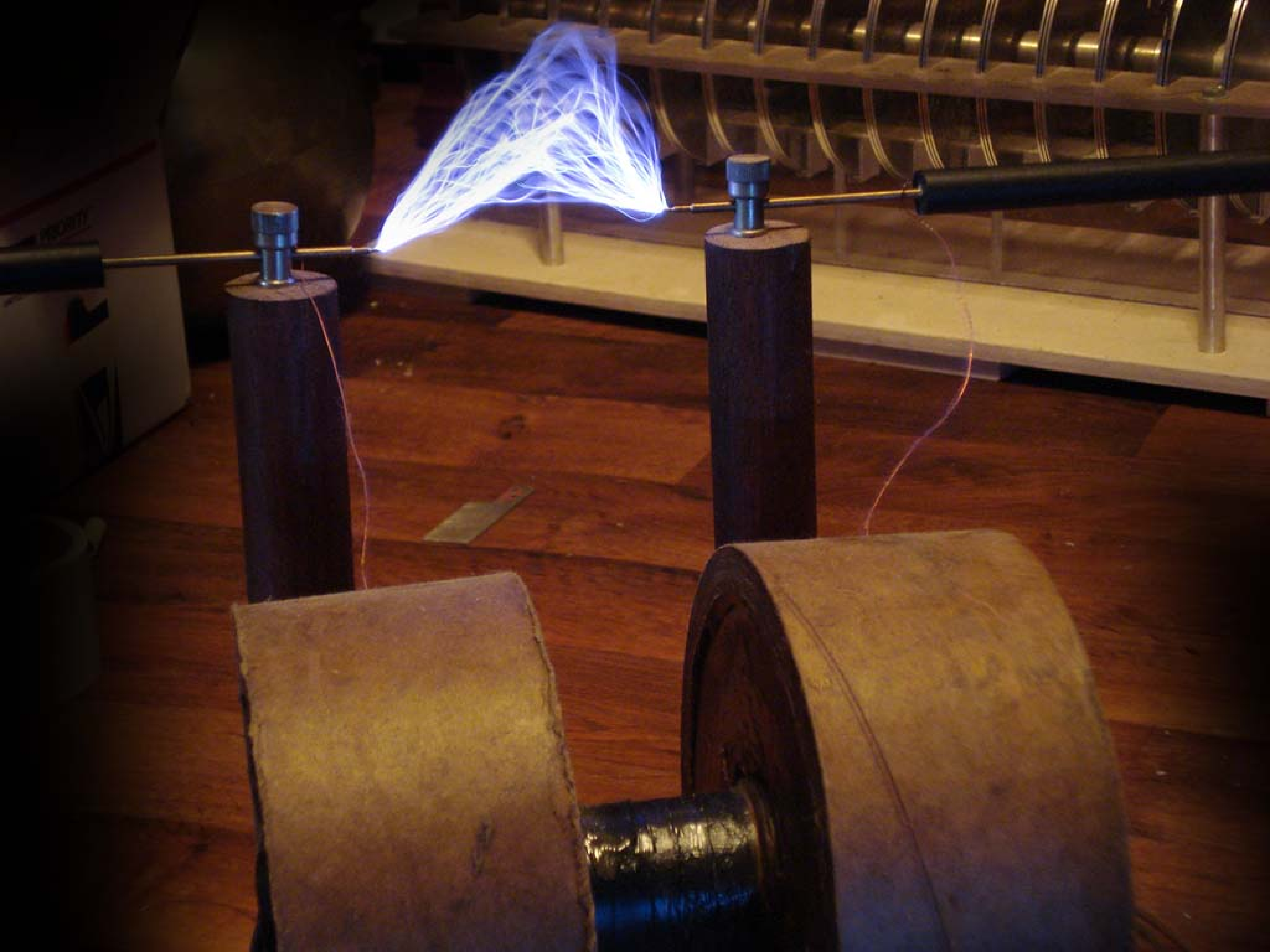








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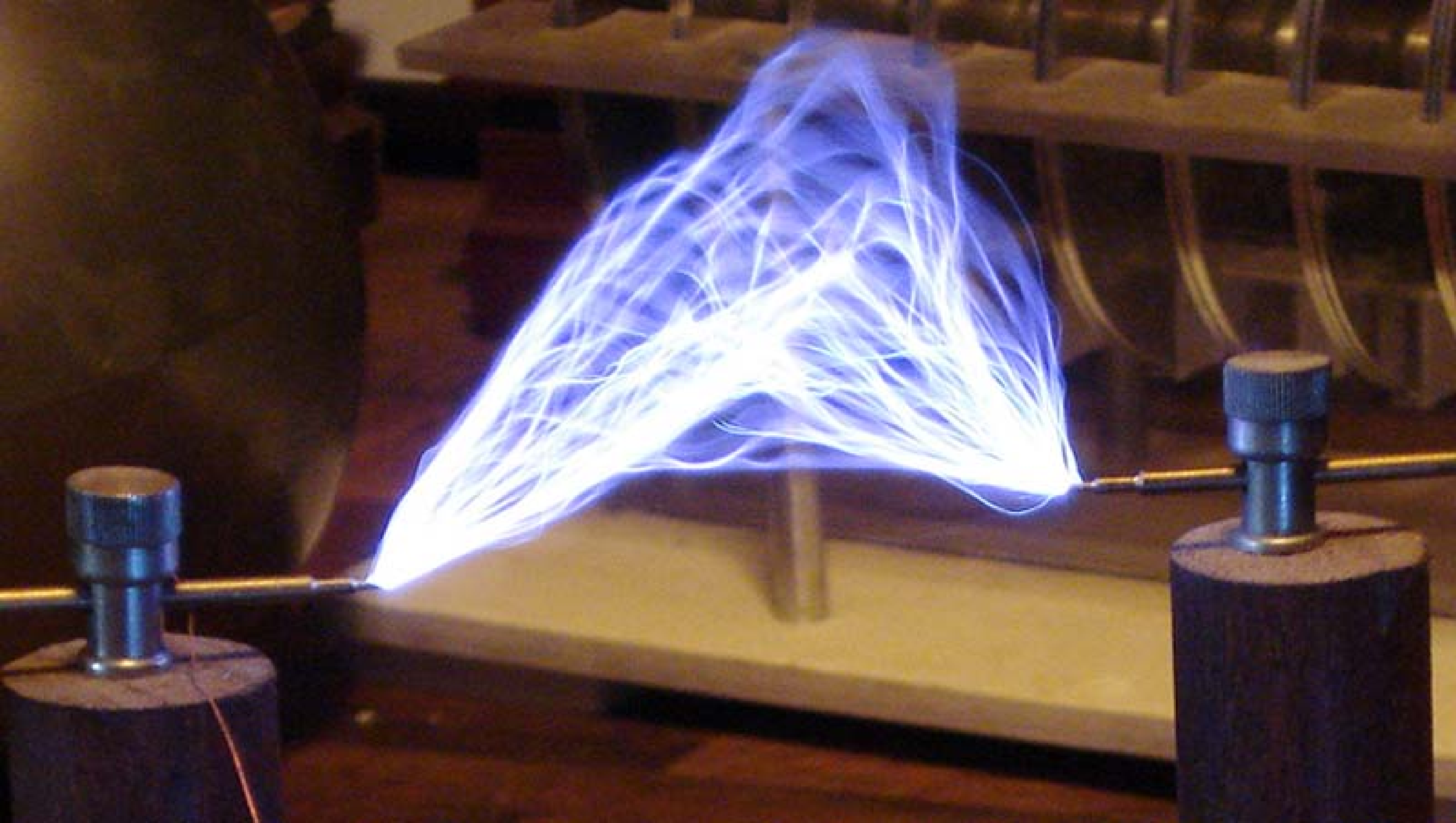

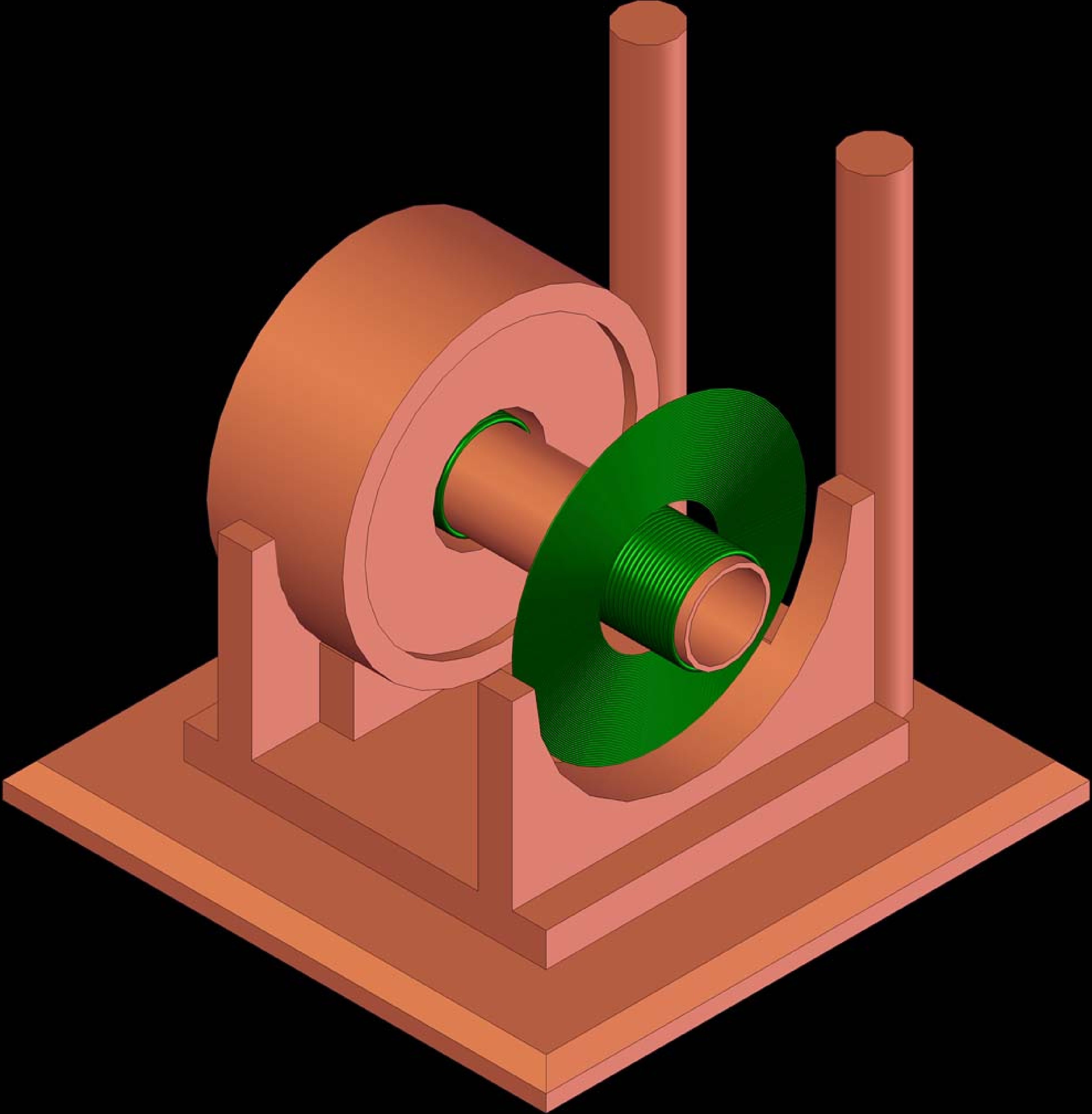

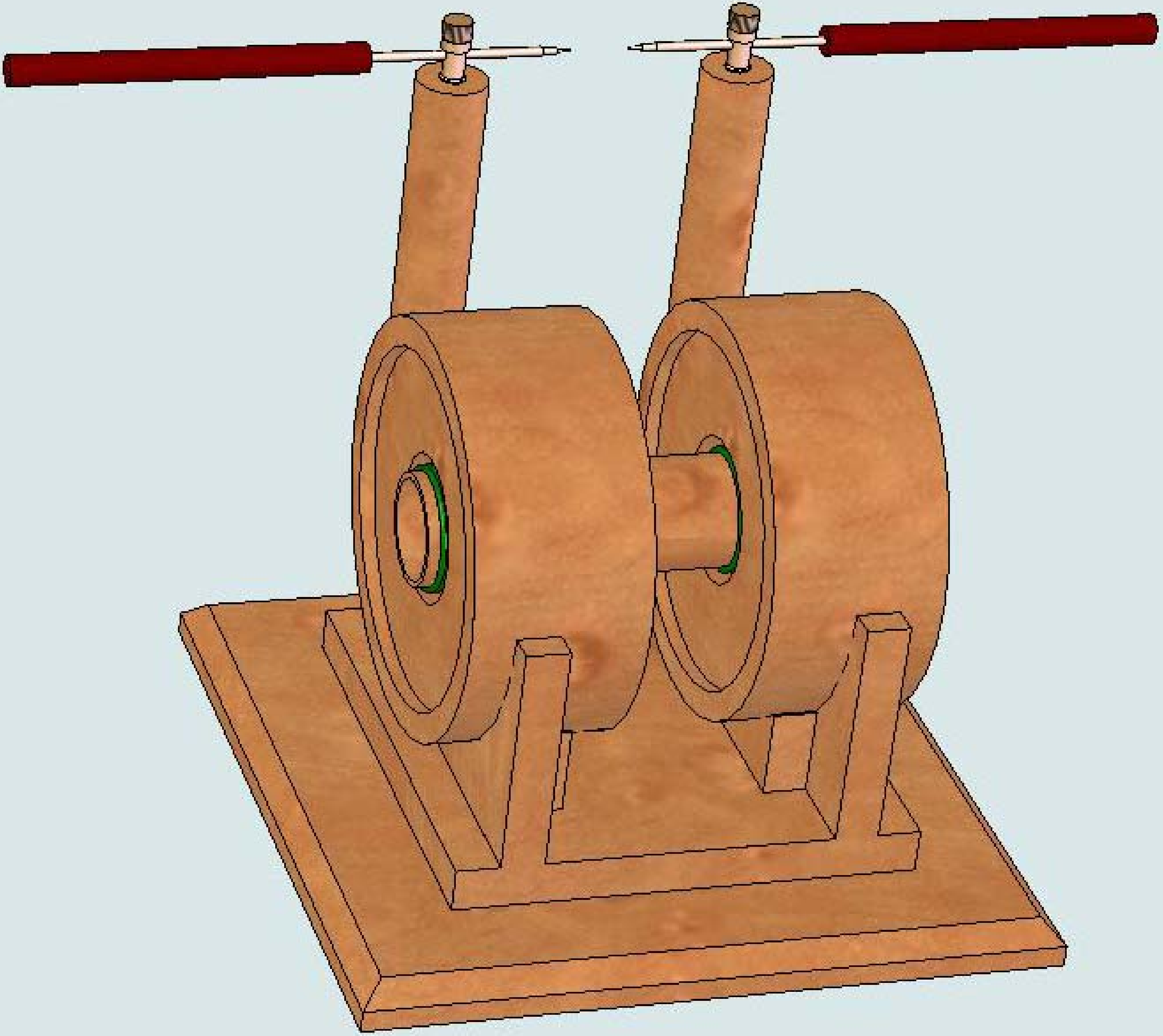

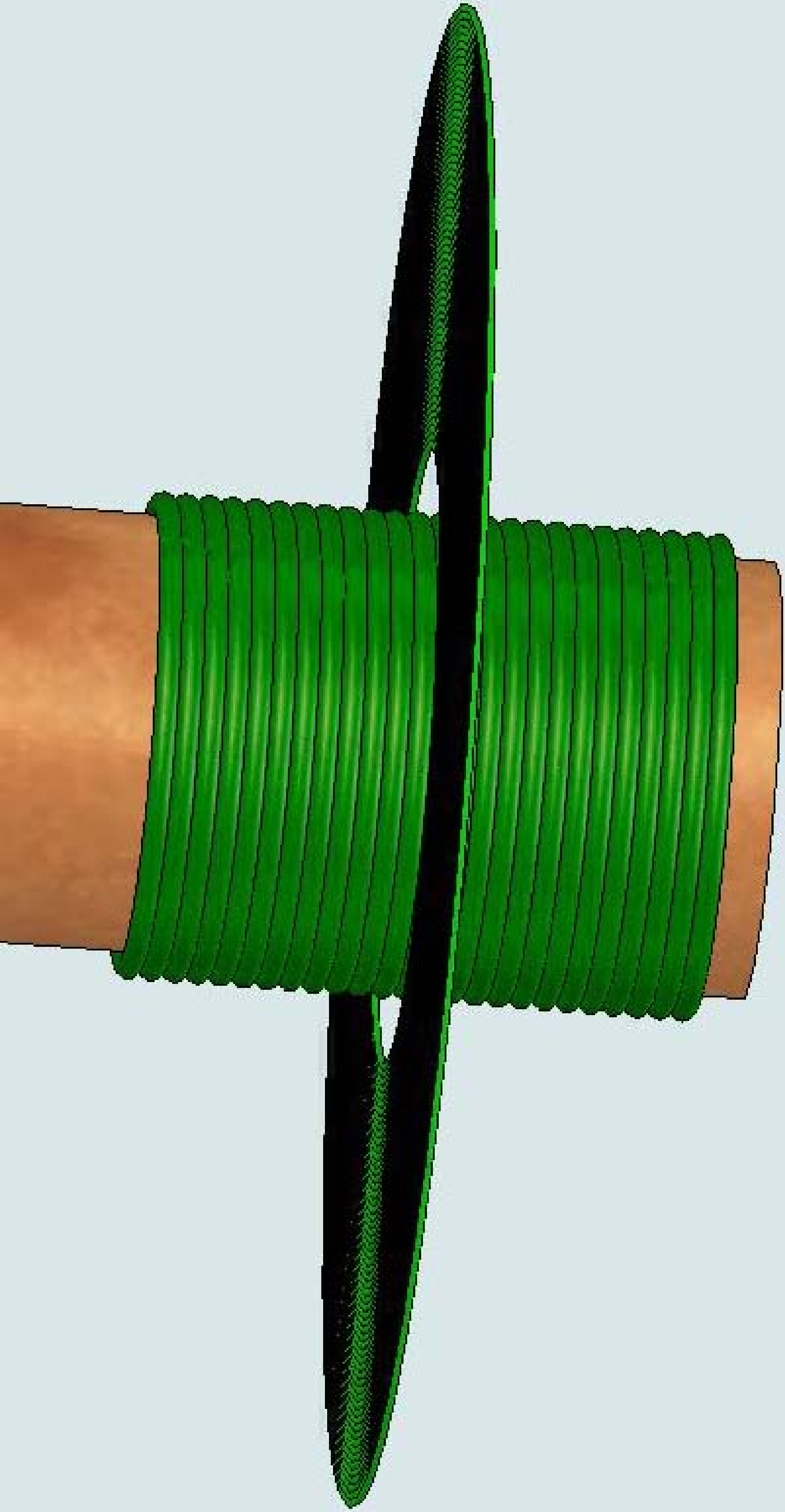

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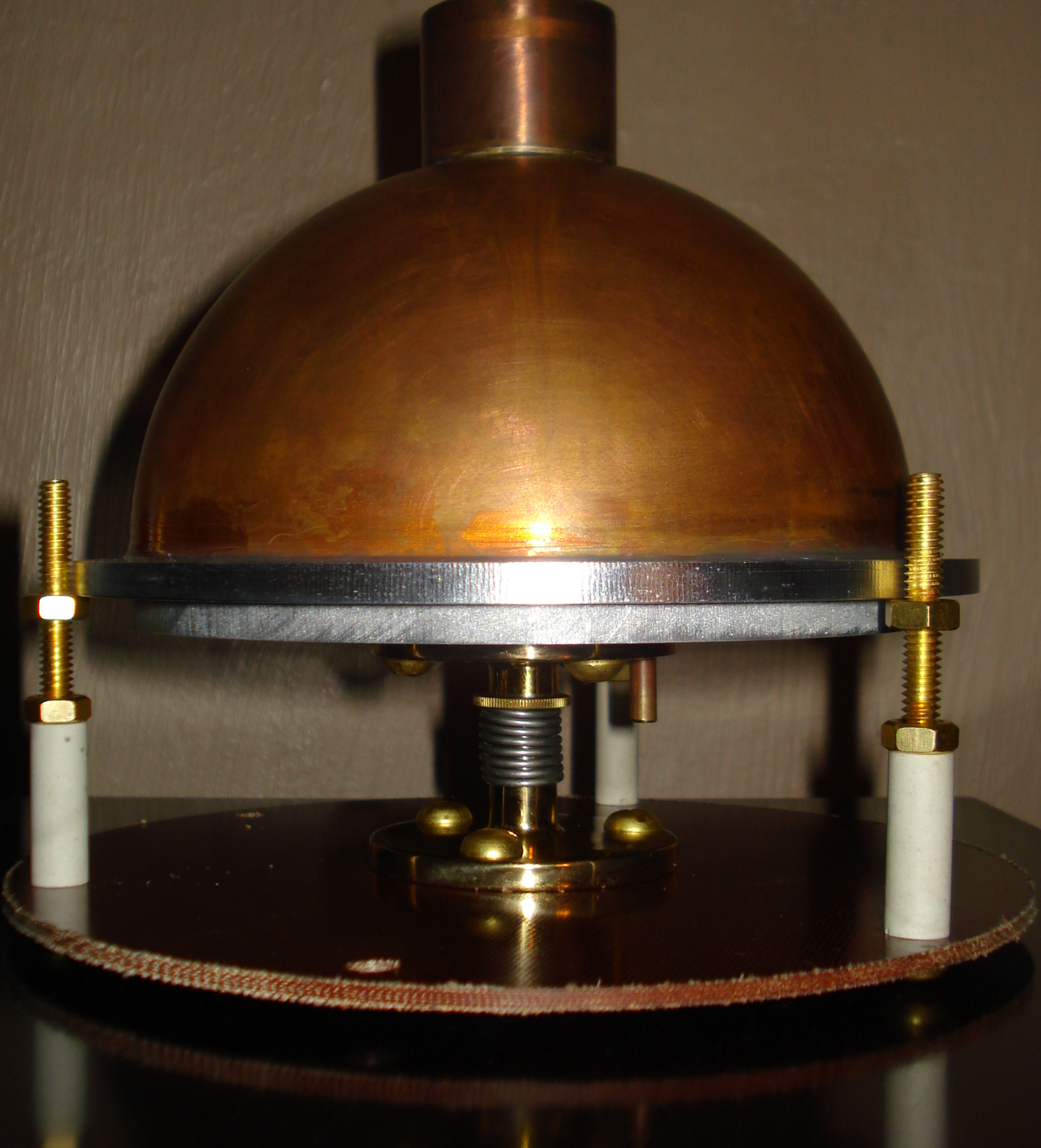

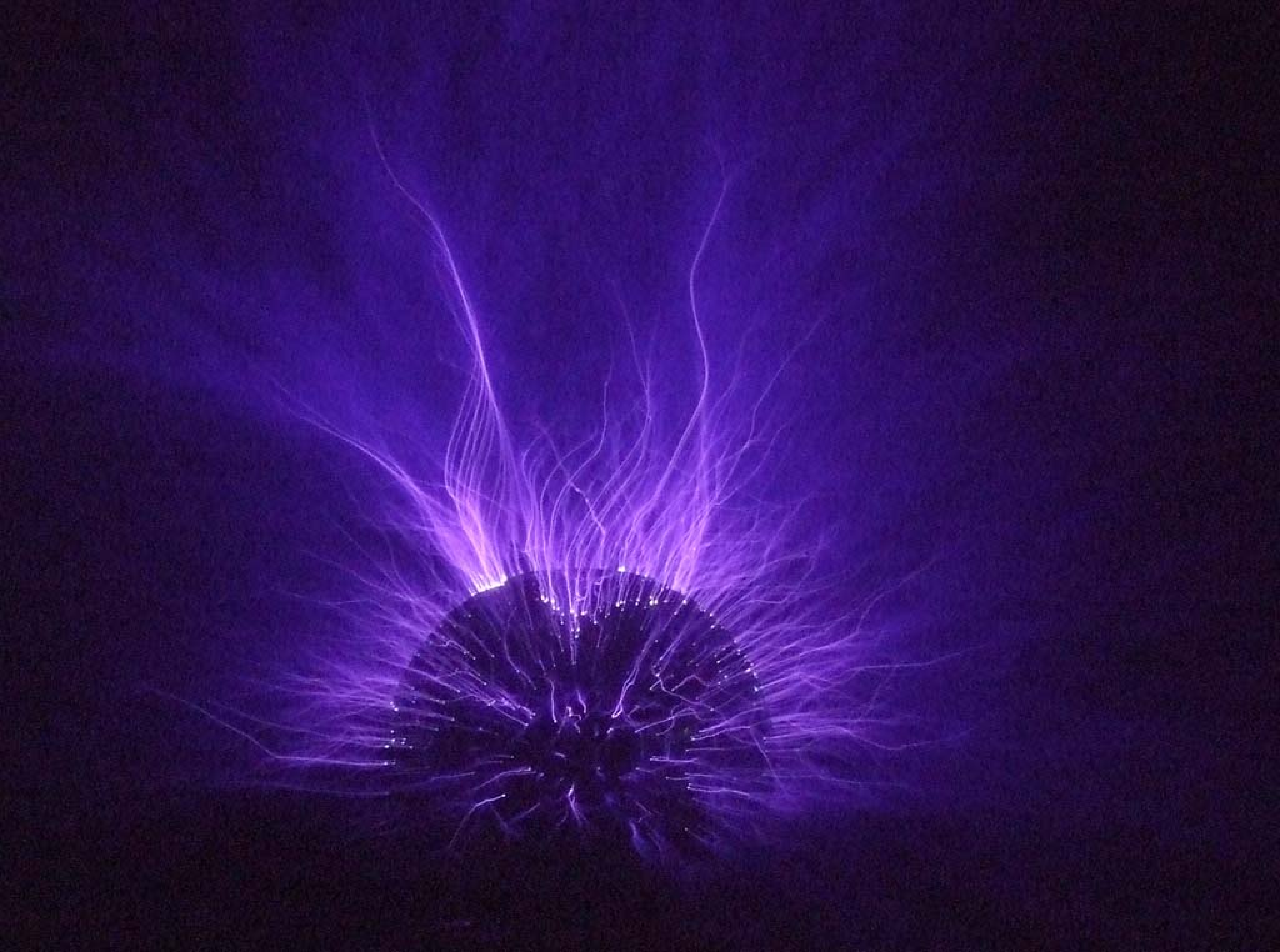

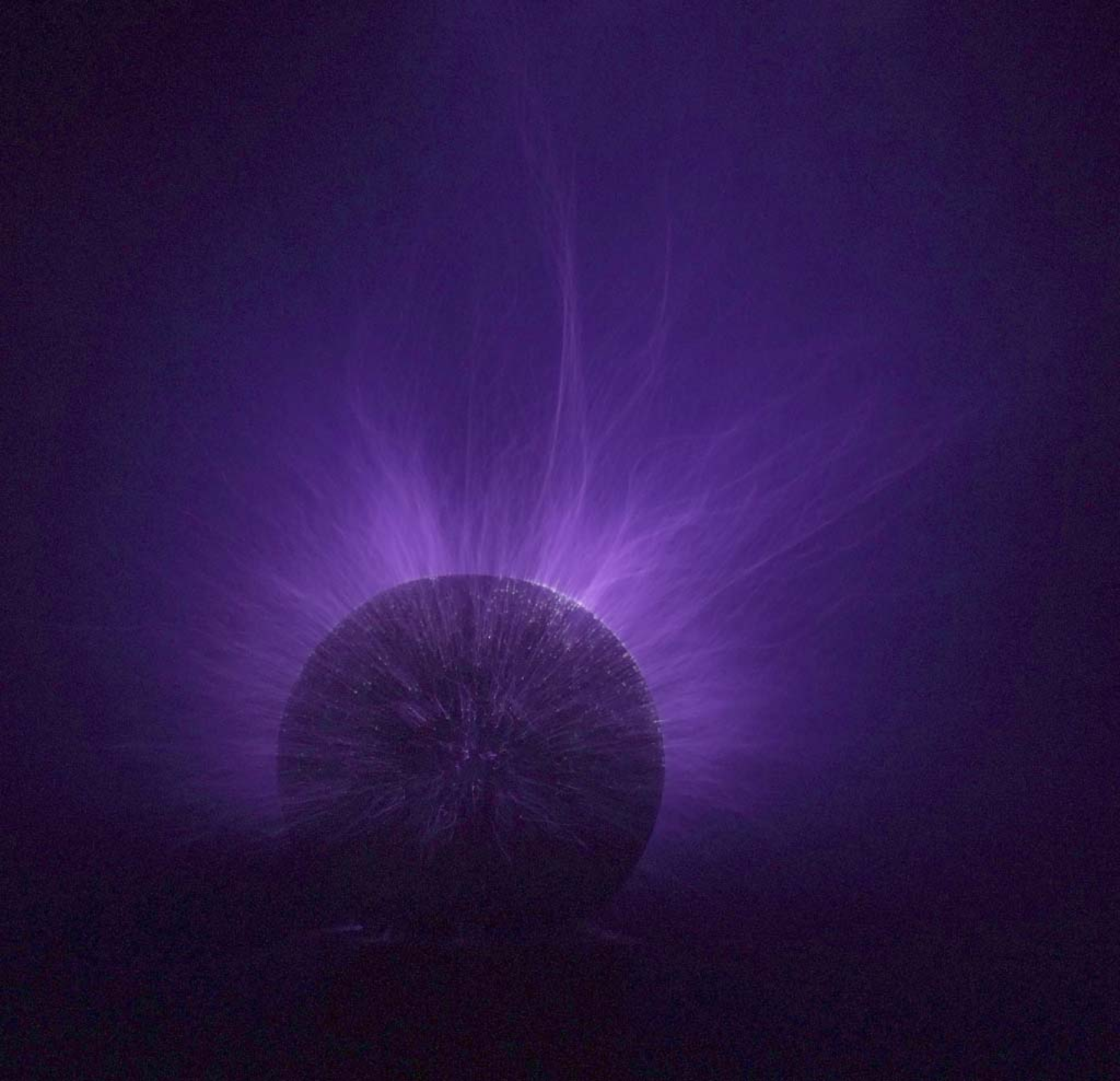

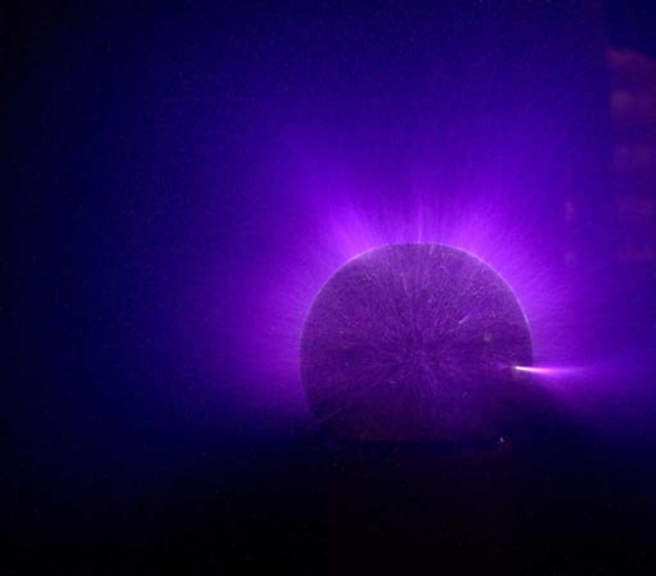

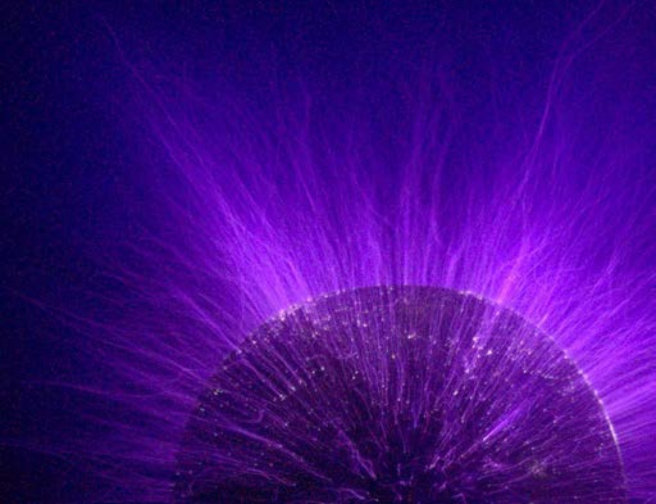

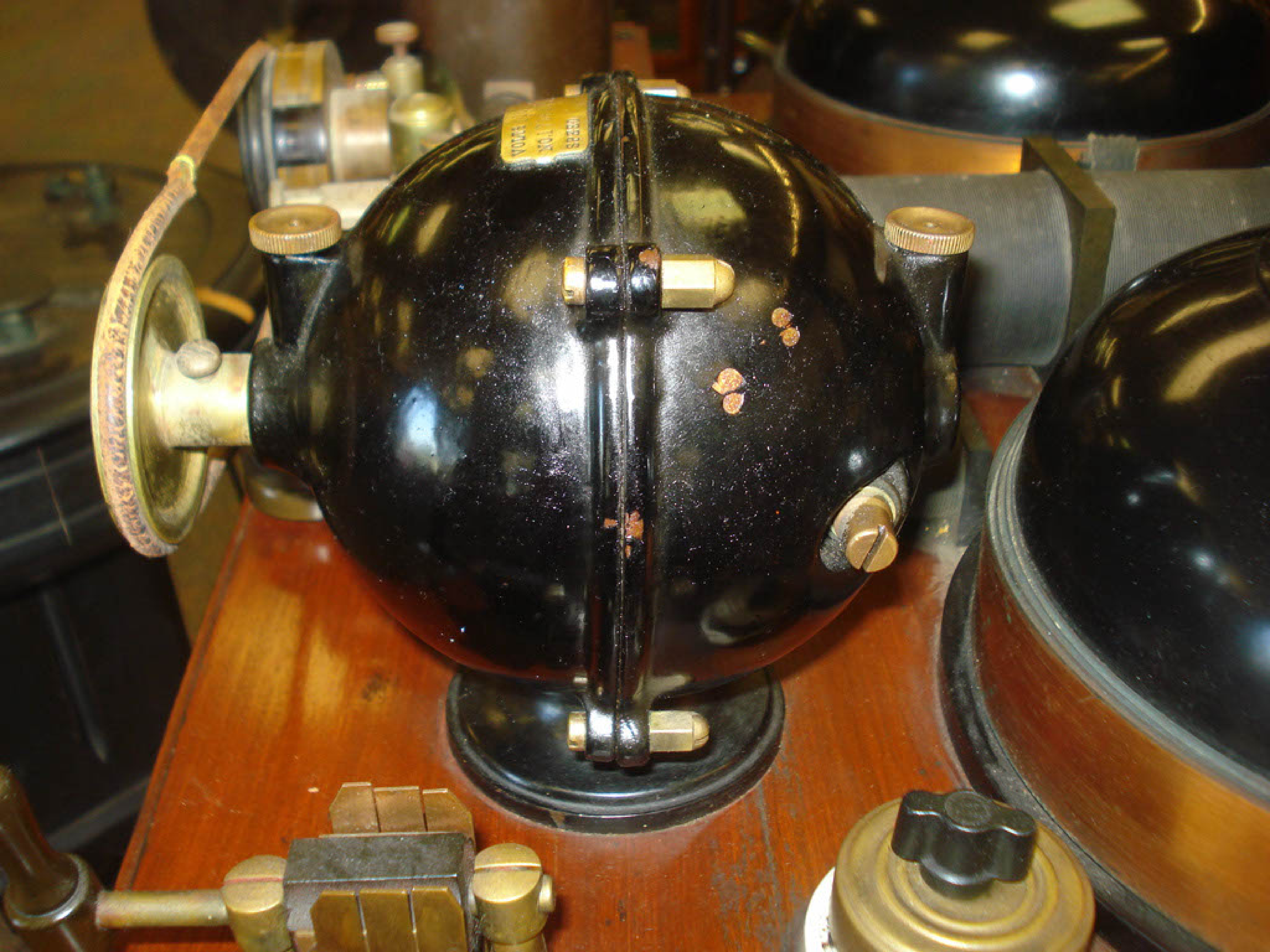

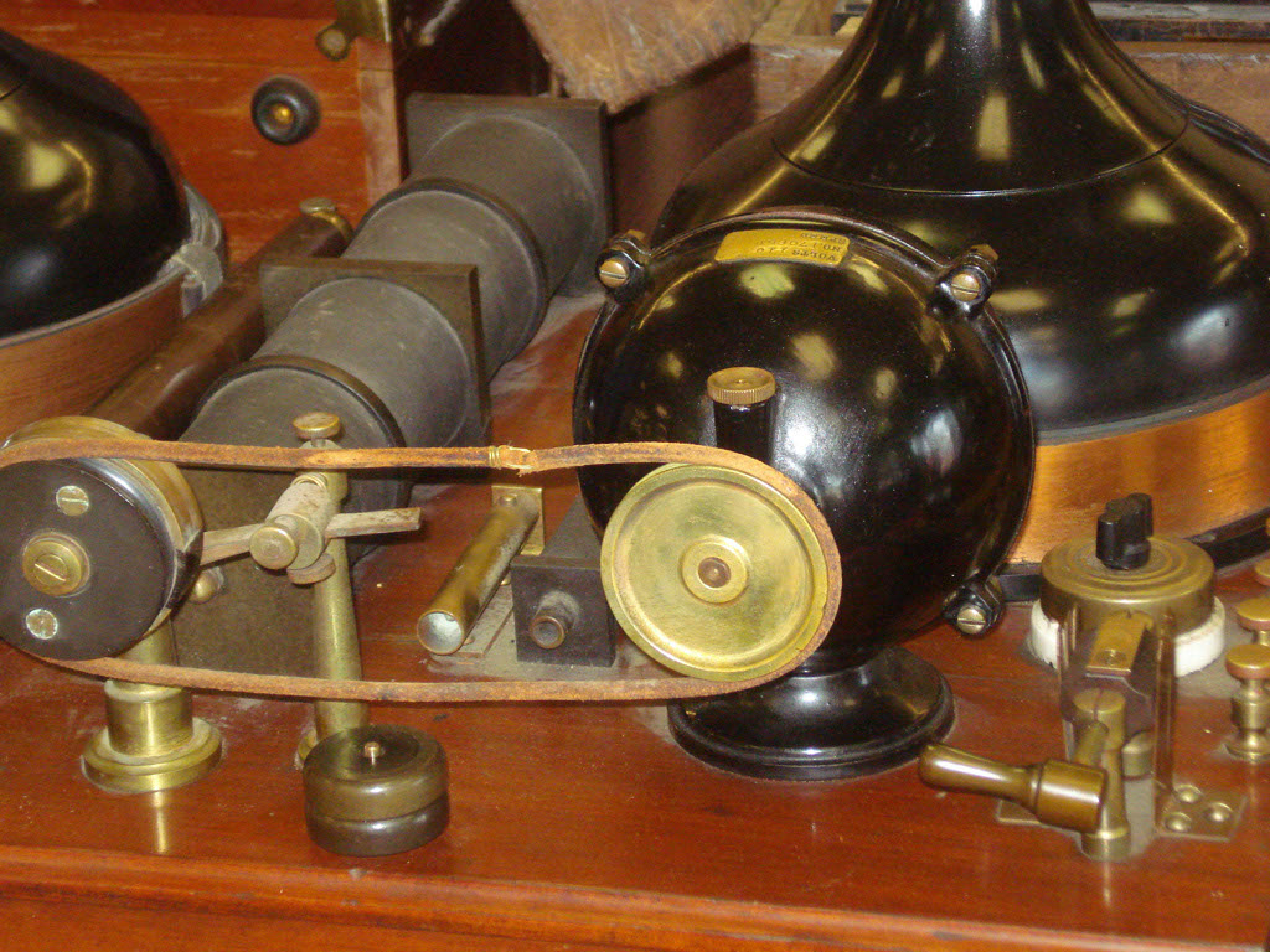

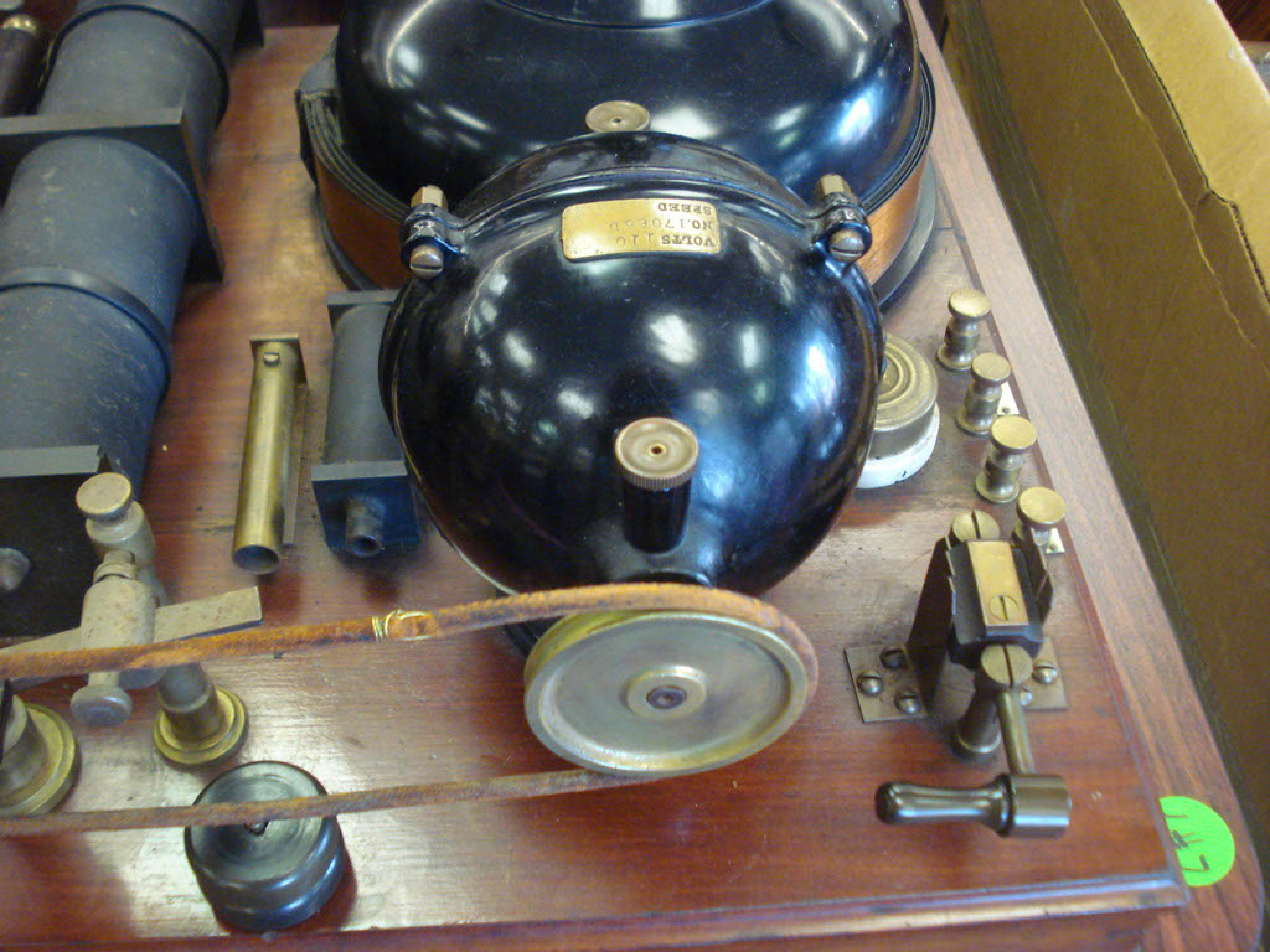
VOLTS 110
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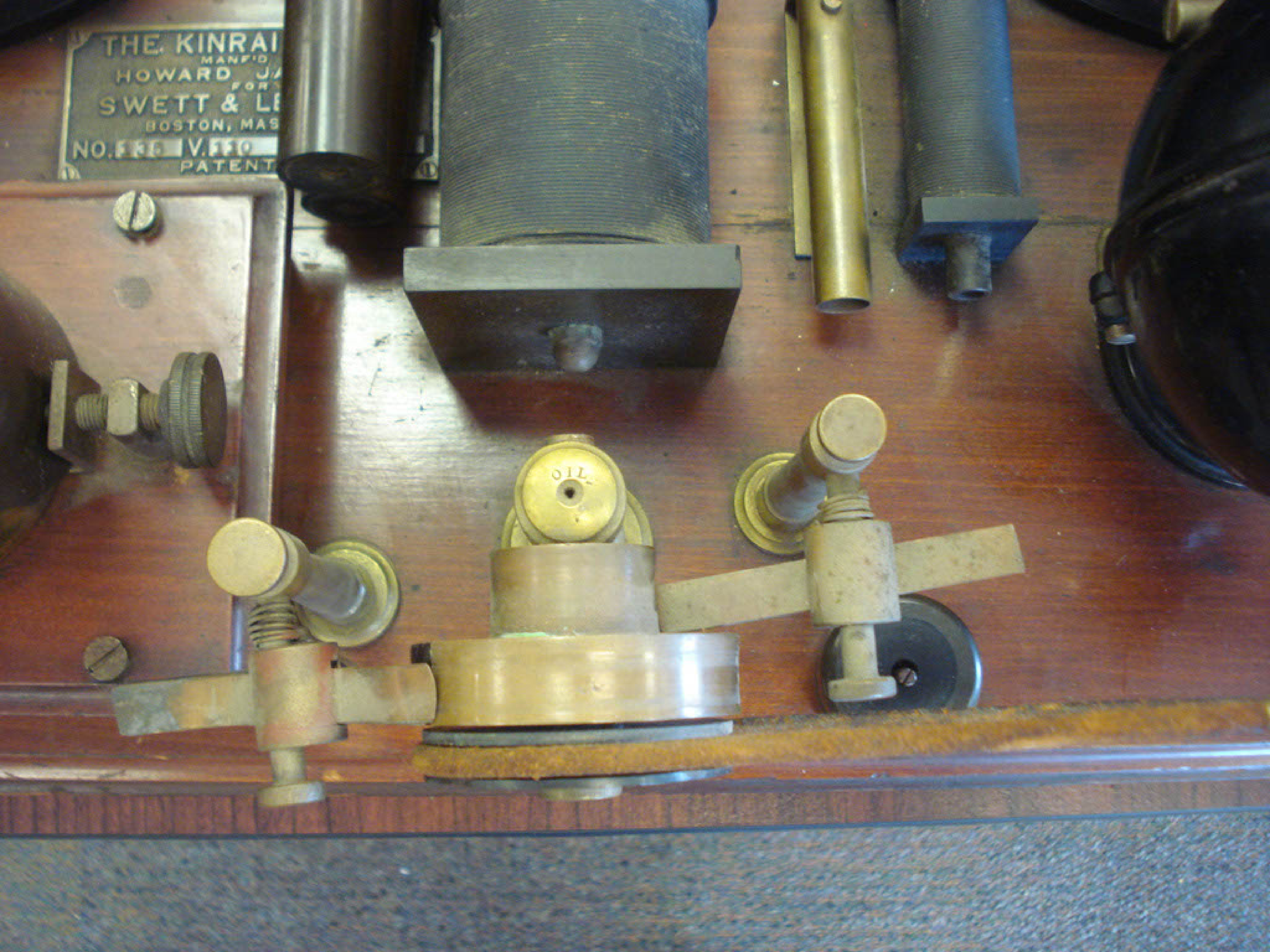
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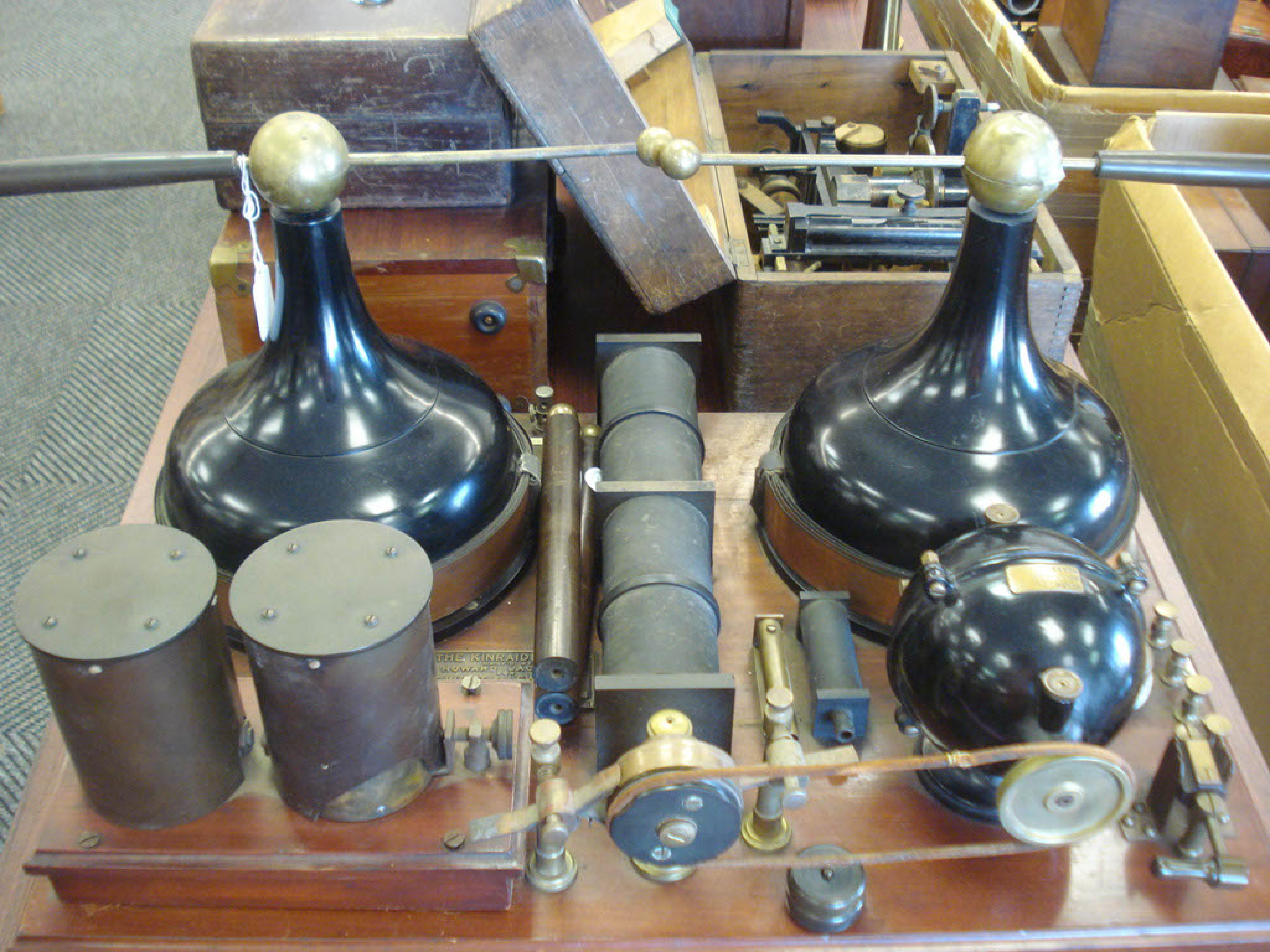
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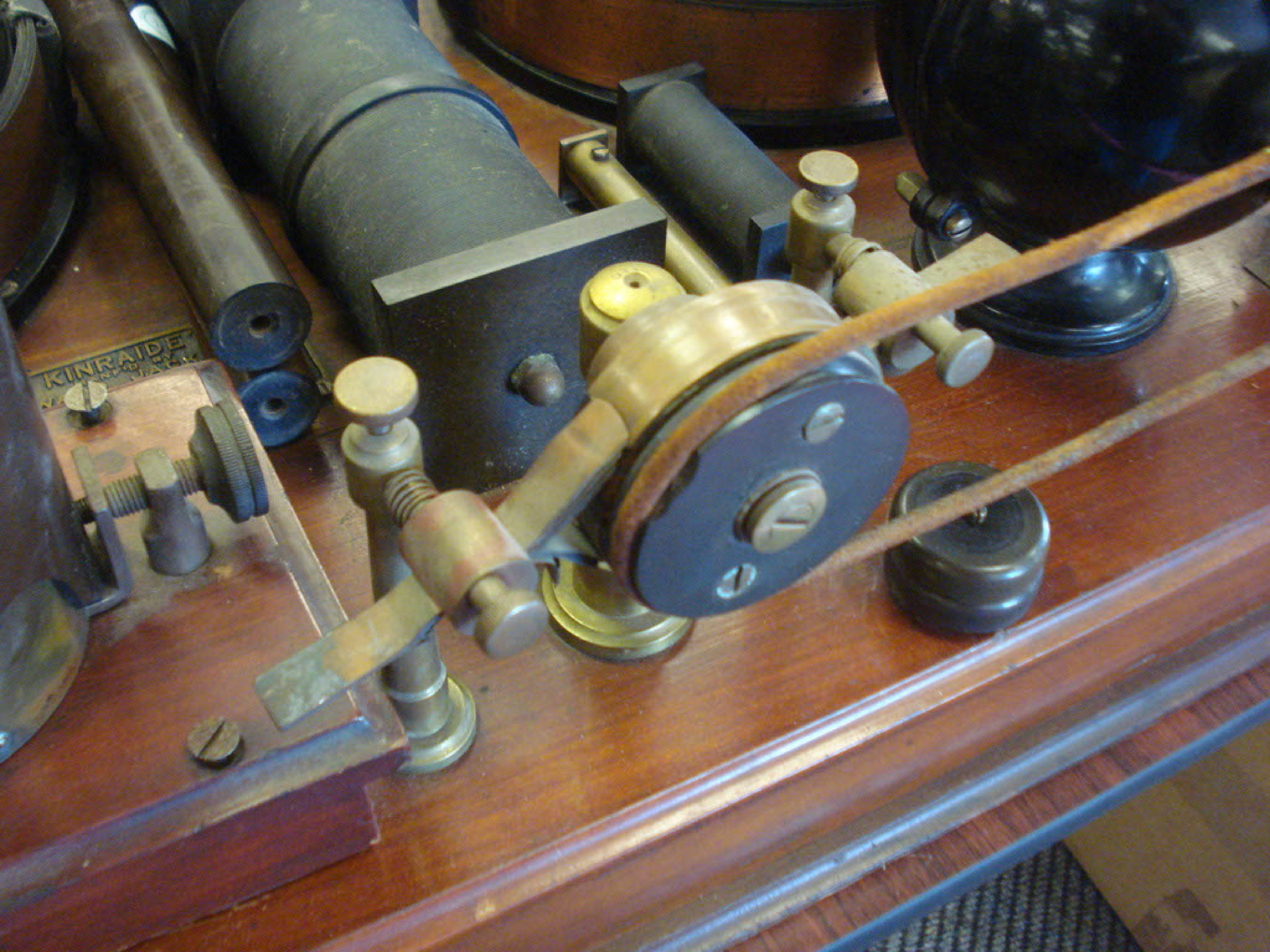
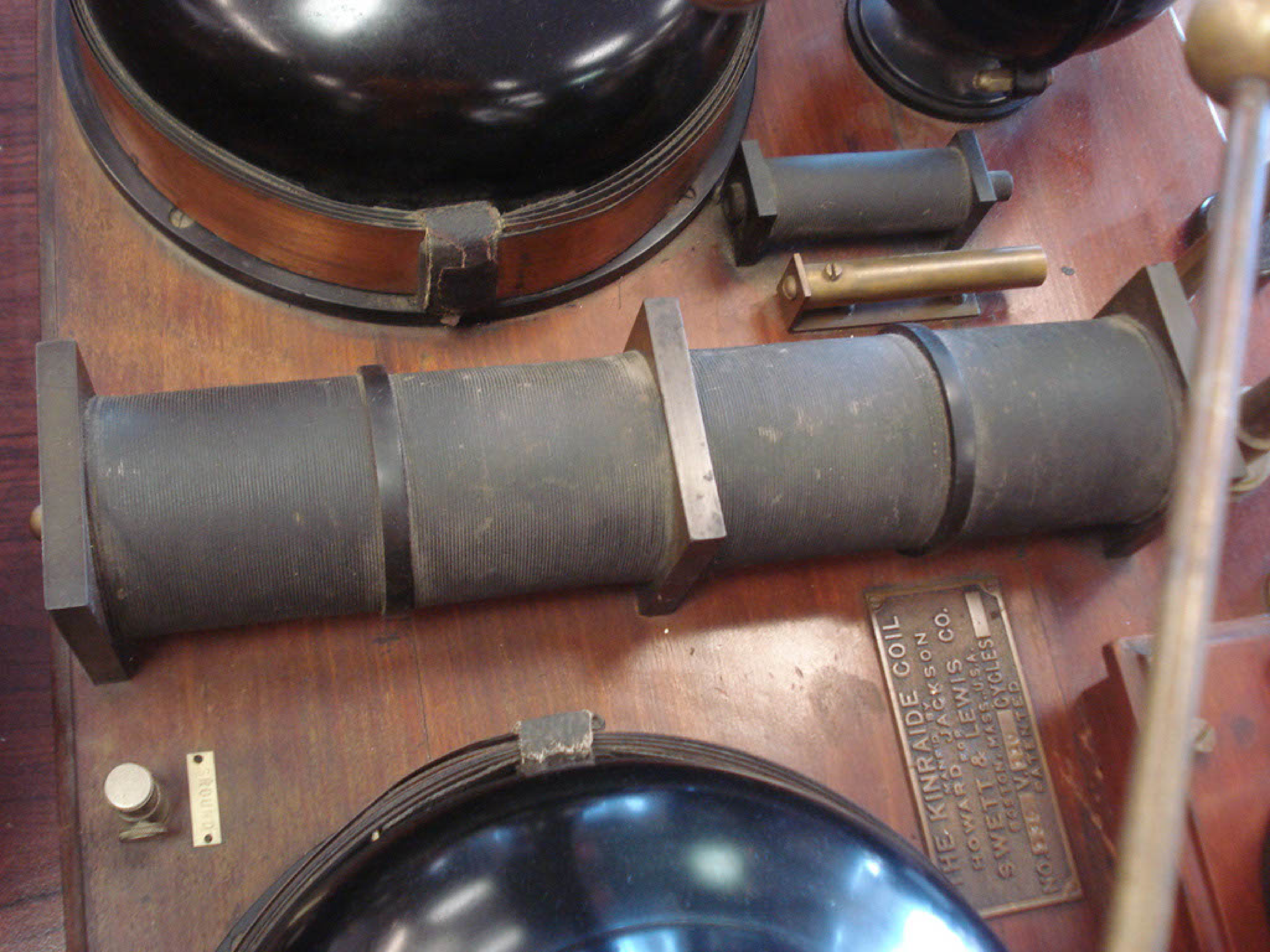

KINRAIDE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HOWARD P. JACKSON
MANF'D FOR
SWETT & LEWIS CO.
BOSTON, MASS. U.S.A.
V. CYCLES
NO. PATENTED
GROUND

VOLTS 110
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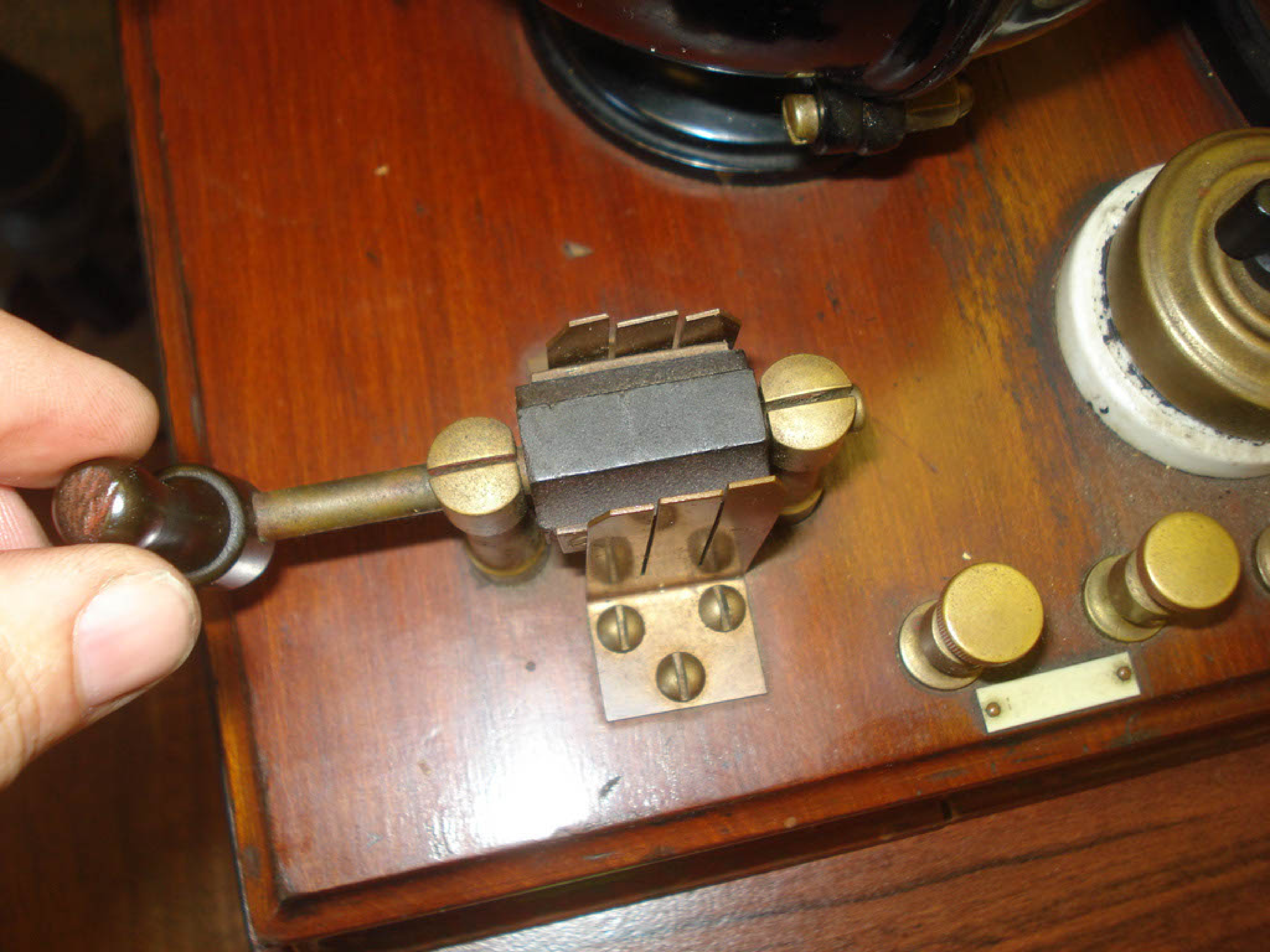
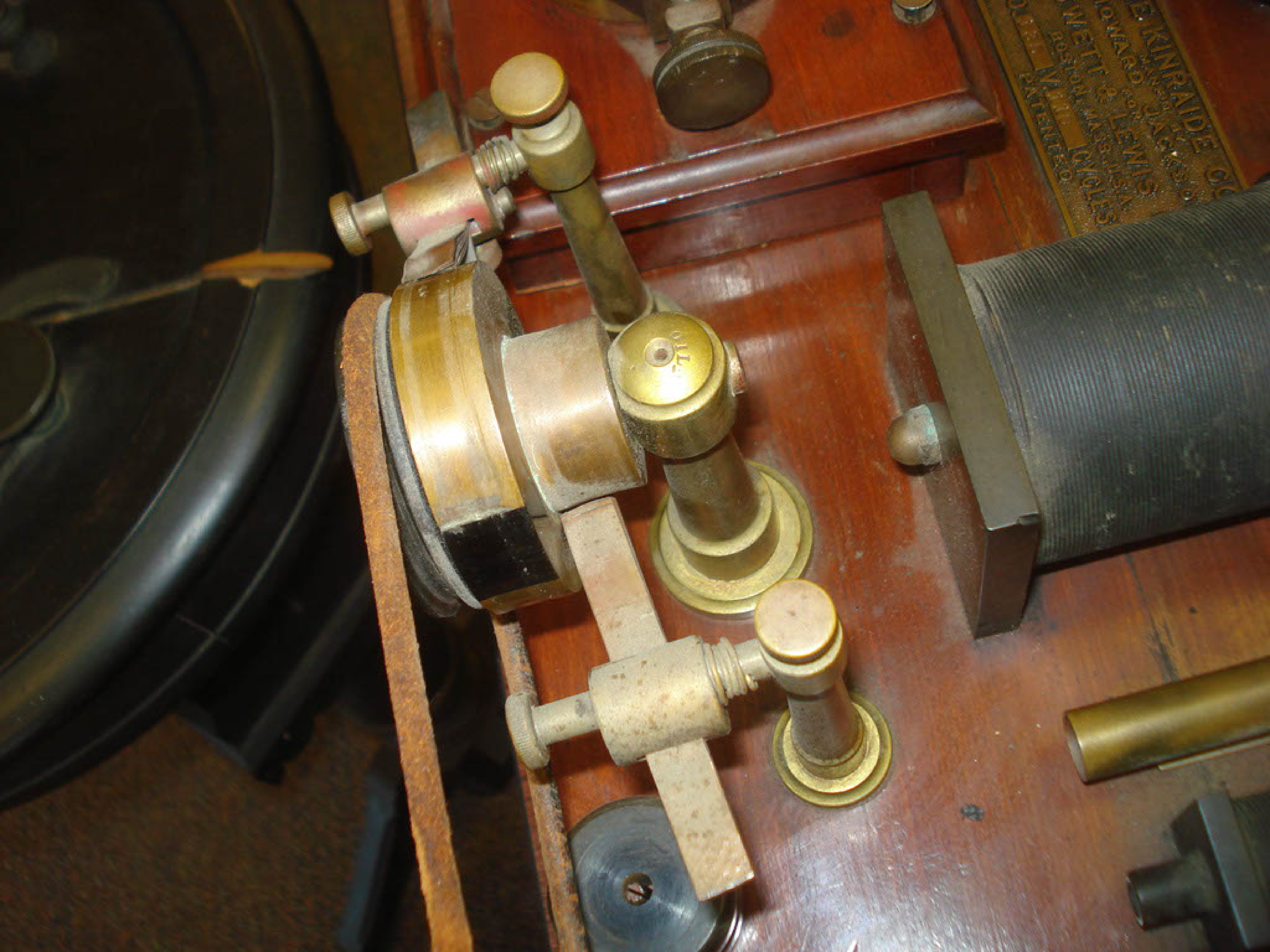
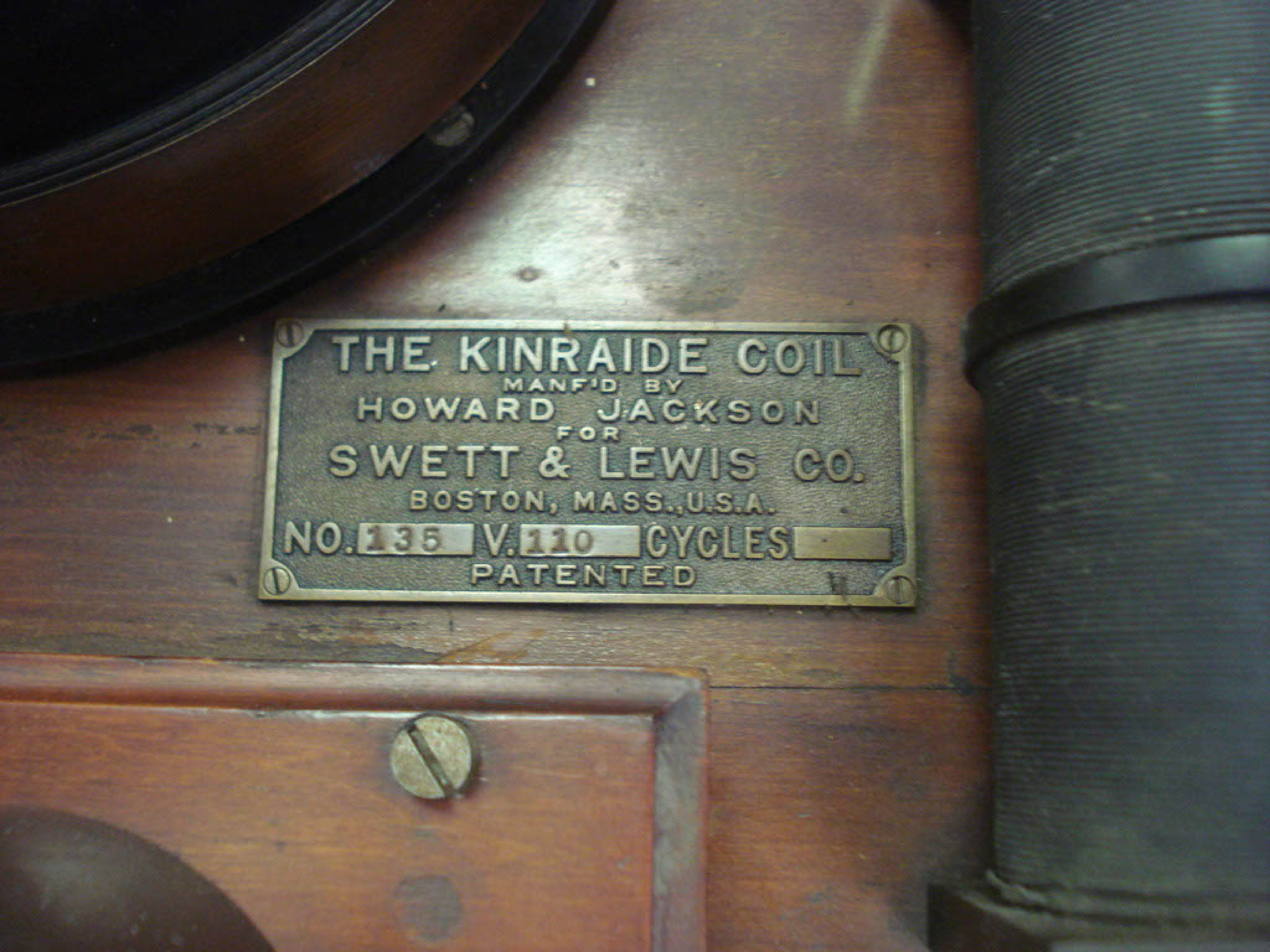
THE KINRAIDE
MANF'D BY
HOWARD JACK

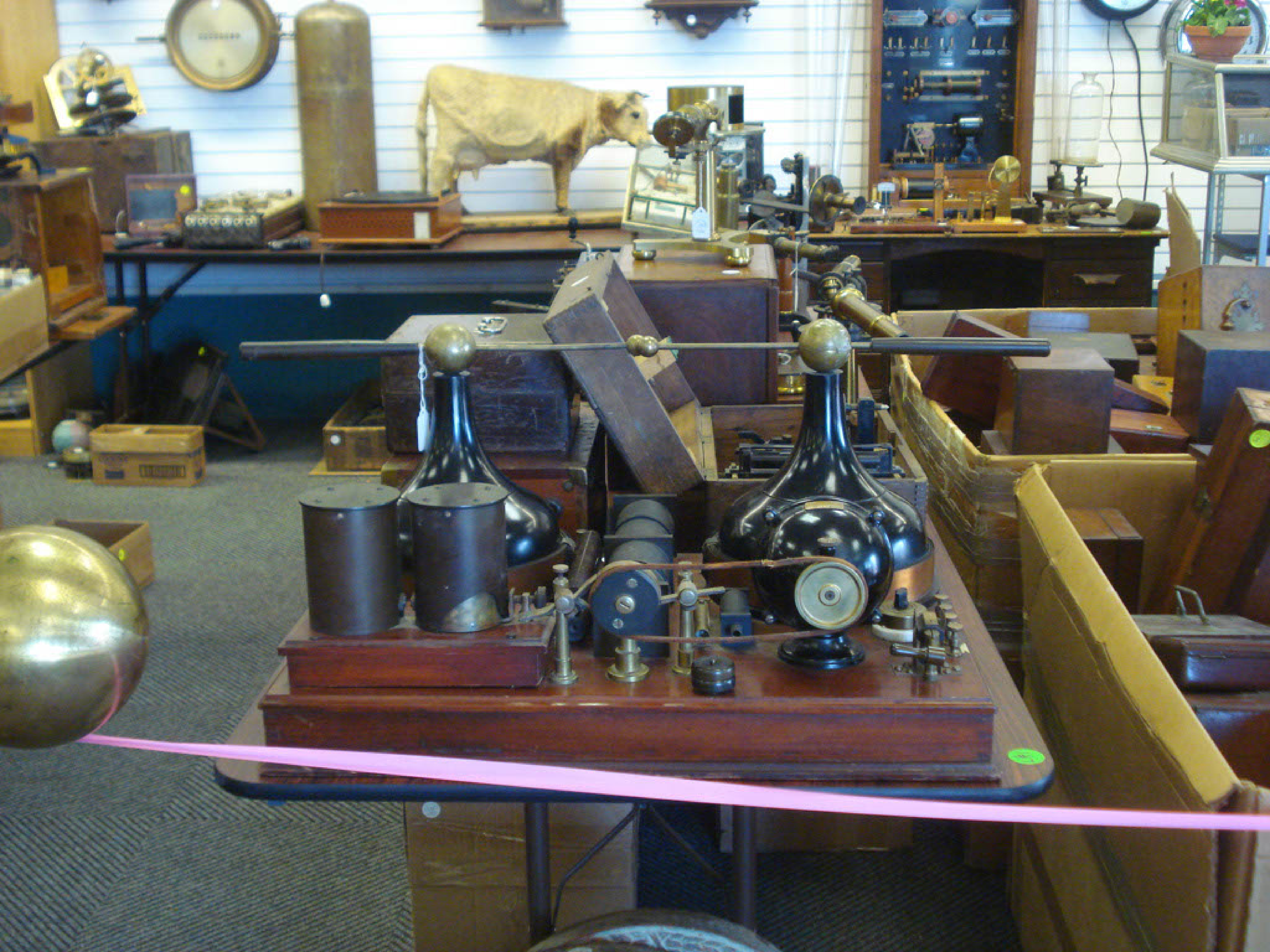
VOLTS 110
NO.17065D
SPEED

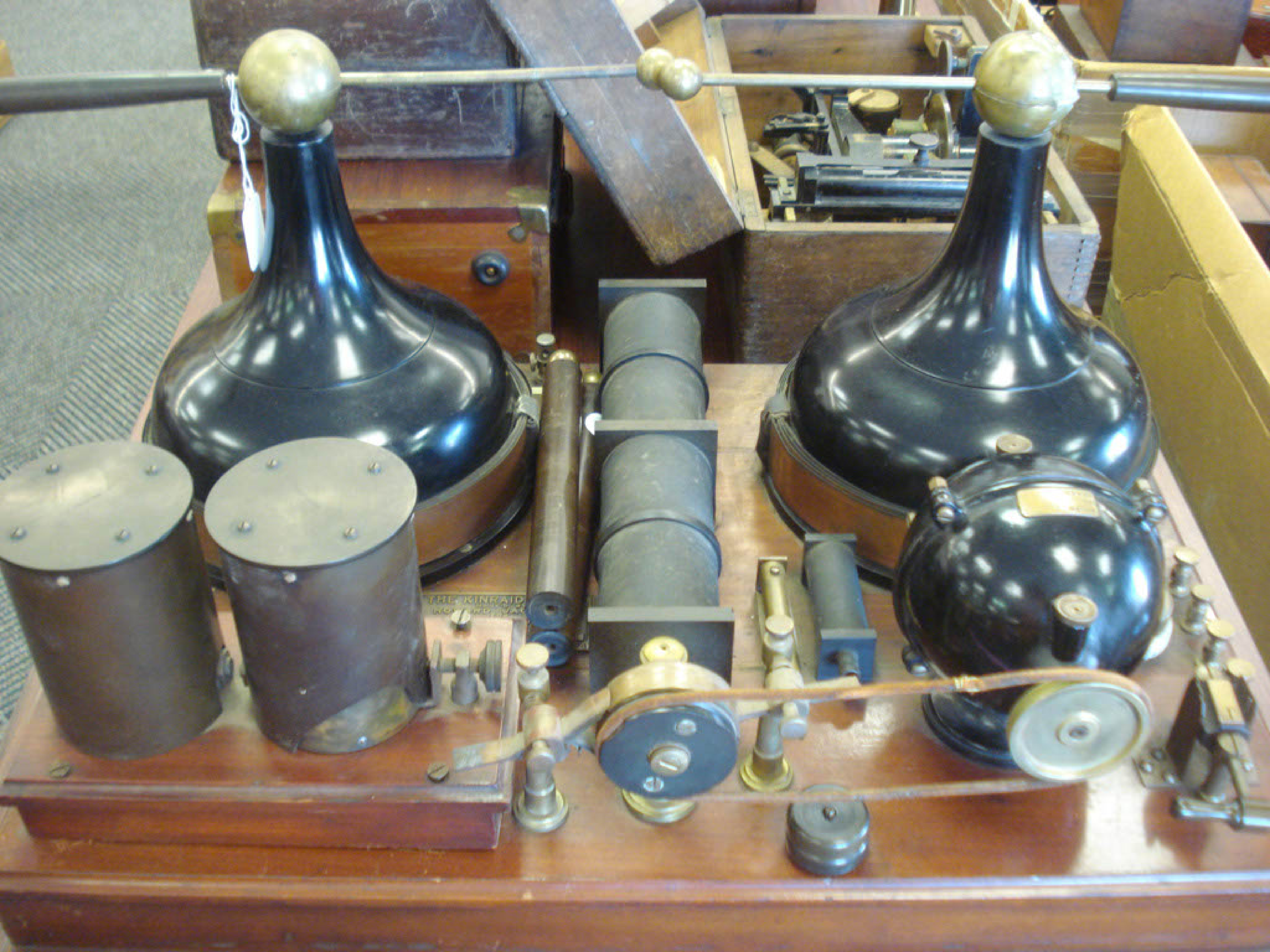




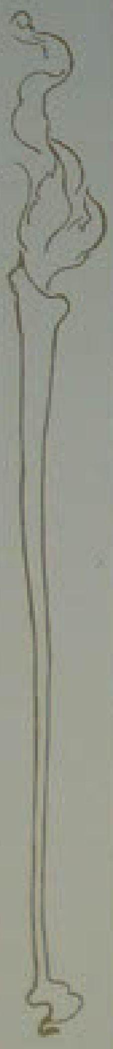
KINRAIDE CO
JEWETT & LEWIS
BOSTON MASS USA
VOLTS
CYCLES
PATENTED
OIL


THE KINRAIDE COIL
MANF'D BY
HOWARD JACKSON
FOR
SWETT & LEWIS CO.
BOSTON, MASS., U.S.A.
NO. 135 V. 110 CYCLES
PATENTED




THE KINRAID

MENU



Huitres

Potage Electrolytique

Hors d'oeuvres

Radis Olives Céleri Amandes Salées

Filet de Bass à la Chevalière

Tomates farcies aux concombres

Volaille et Champignons frais à la Suzette

Filet de boeuf piqué, Sauce au Madère

Pommes de terre rissolées Haricots verts panachés

Pamplemousse au marasquin

Canard tête noire rôti

Gelée de Groseilles Hominy frit

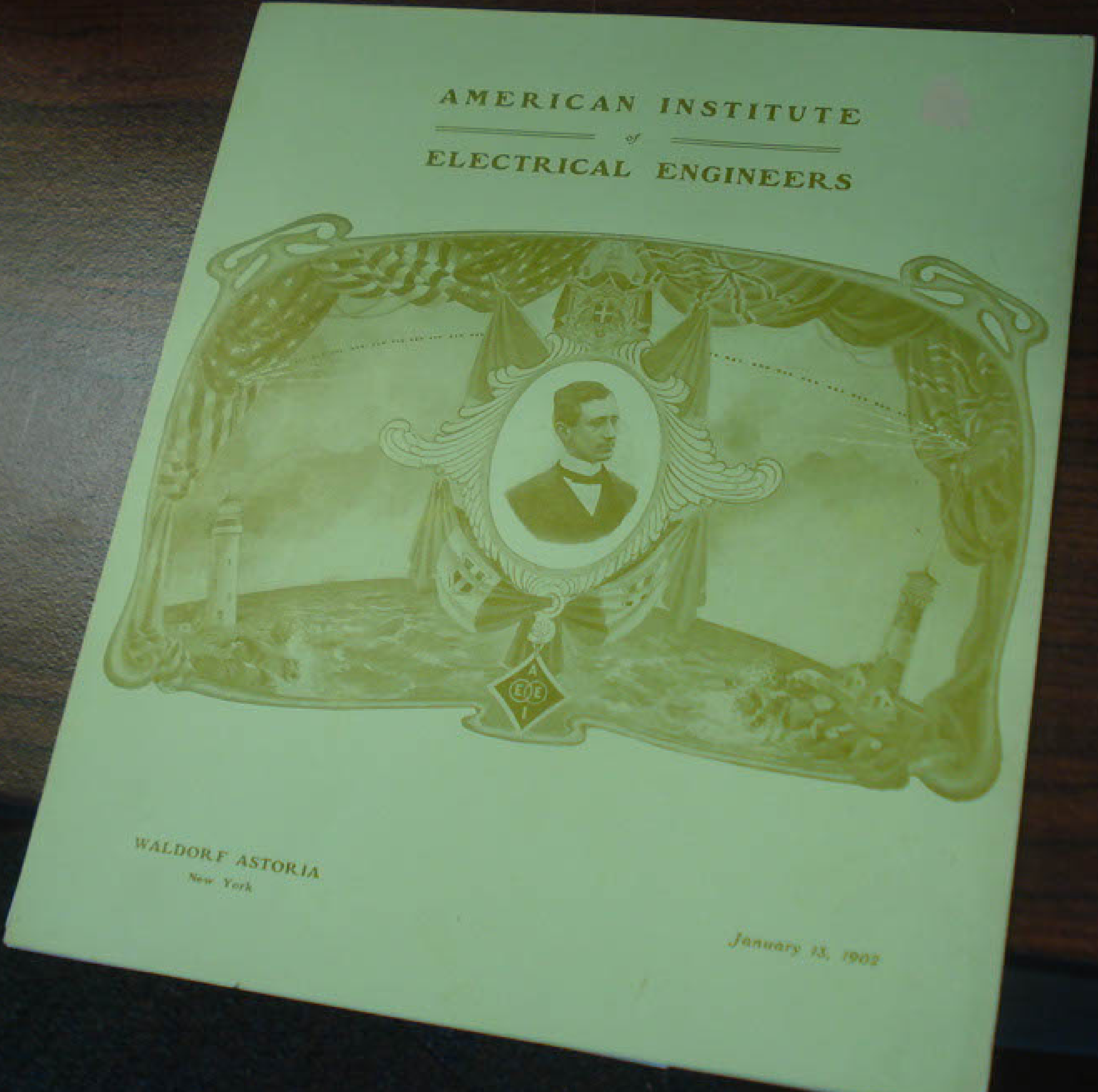
Salade de Romaine

Glaces de fantaisie Gâteaux assortis

Fruits

Café

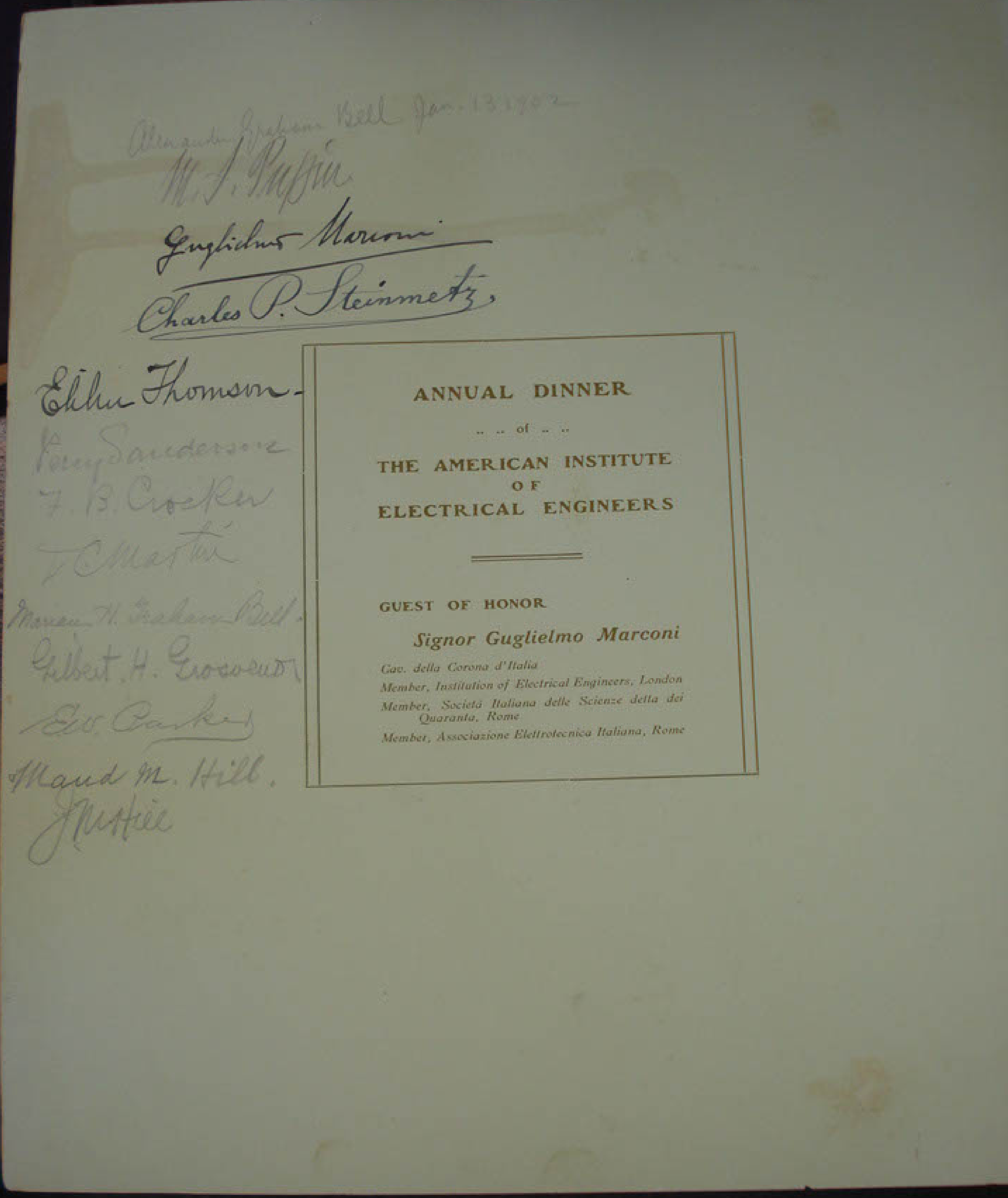
Cigares Cigarettes



AMERICAN INSTITUTE
of
ELECTRICAL ENGINEERS

WALDORF ASTORIA
New York

January 13, 1902



Alexander Graham Bell Jan. 13 1902

M. I. Pupin

Guglielmo Marconi

Charles P. Steinmetz

Elihu Thomson

Percy Sanderson

F. B. Crocker

T. C. Martin

Marian H. Graham Bell

Gilbert H. Grosvenor

E. W. Parker

Maud M. Hill.

J. McHee

ANNUAL DINNER

.. .. of .. ..

THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

GUEST OF HONOR

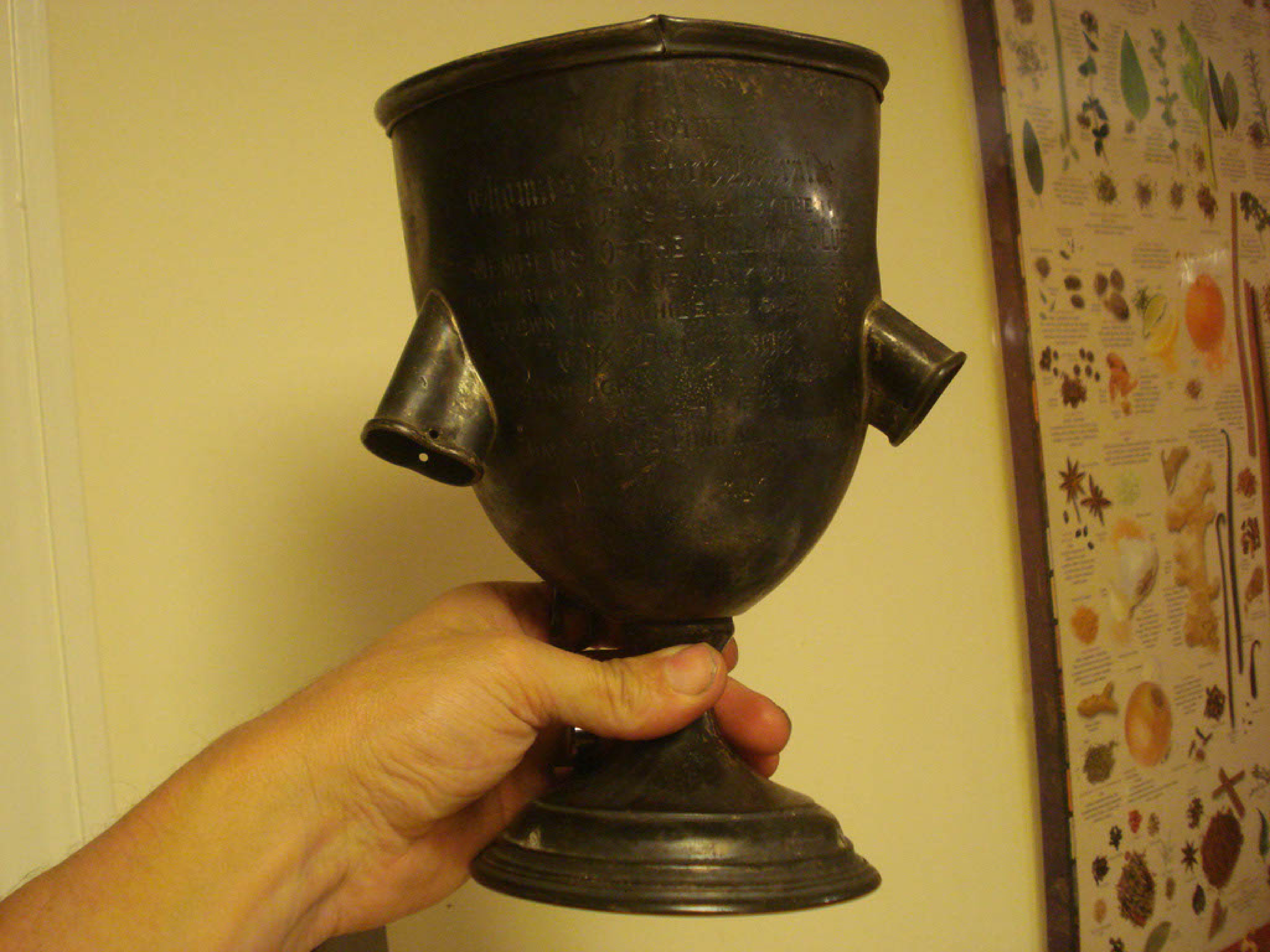
Signor Guglielmo Marconi

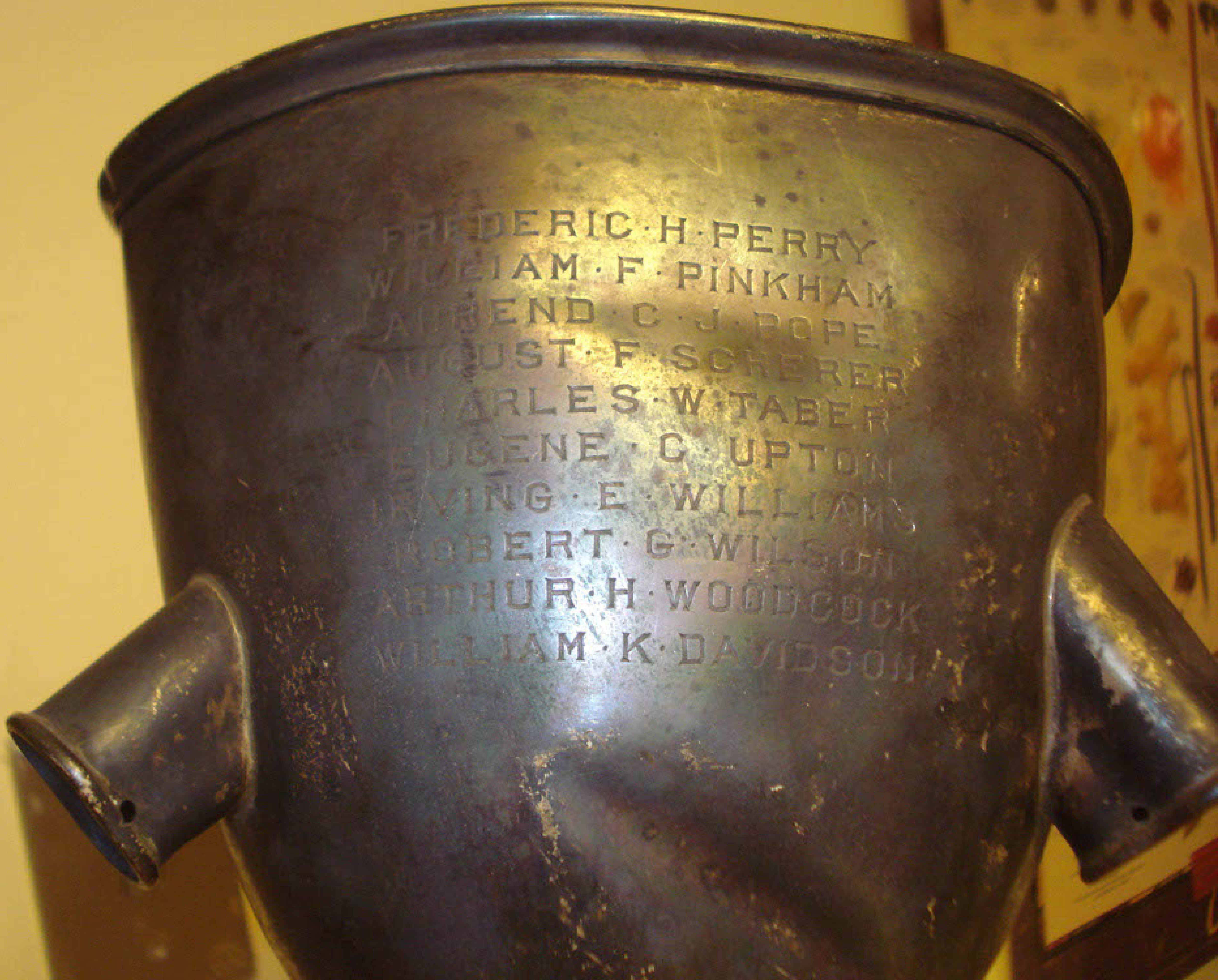
Cav. della Corona d'Italia

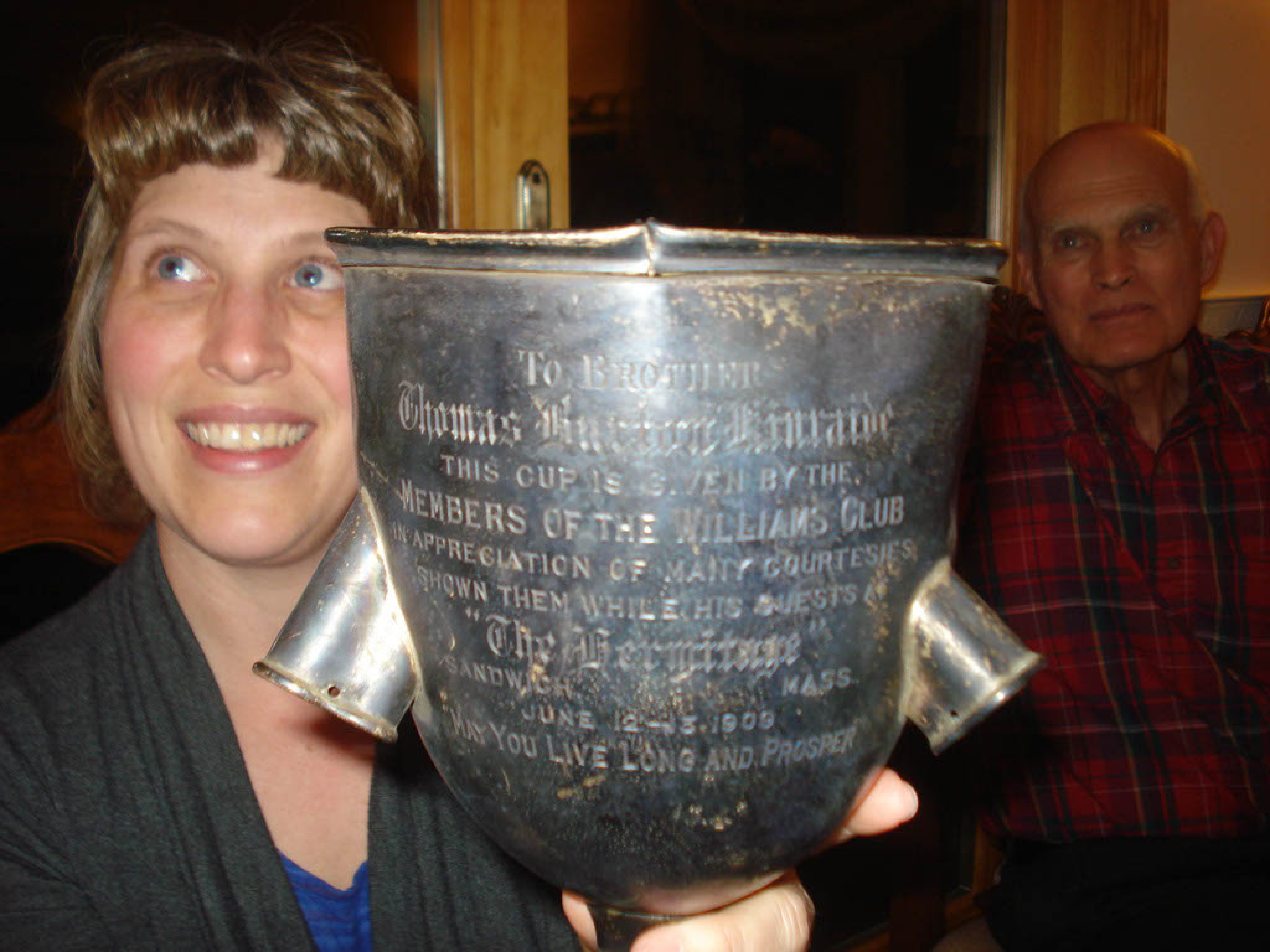
Member, Institution of Electrical Engineers, London

Member, Società Italiana delle Scienze della dei Quaranta, Rome

Member, Associazione Elettrotecnica Italiana, Rome



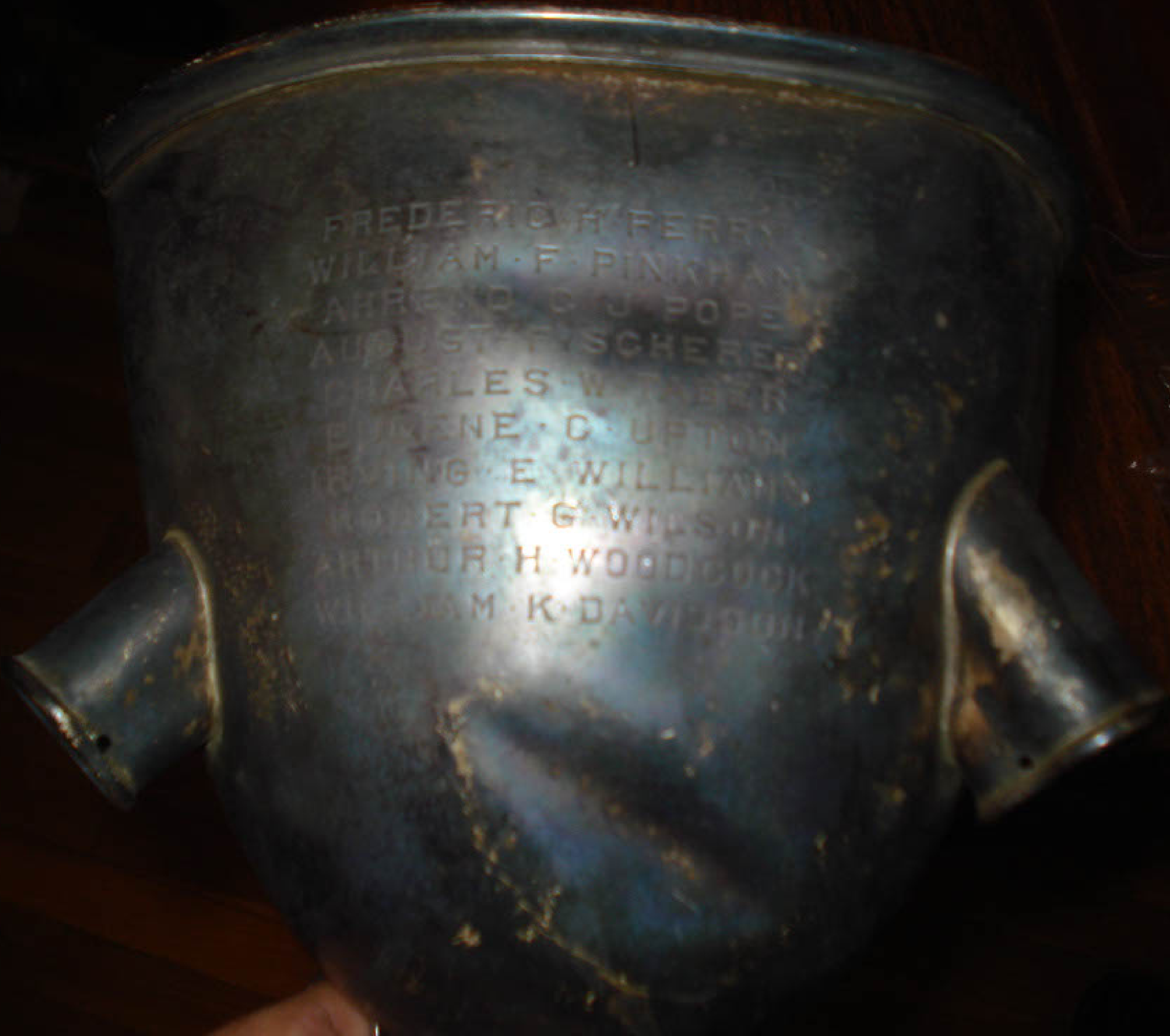

FREDERIC · H · PERRY
WILLIAM · F · PINKHAM
AUBEND · C · J · POPE
AUGUST · F · SCHERER
CHARLES · W · TABER
EUGENE · C · UPTON
IRVING · E · WILLIAMS
ROBERT · G · WILSON
ARTHUR · H · WOODCOCK
WILLIAM · K · DAVIDSON


TO BROTHER
Thomas
THIS CUP IS GIVEN BY THE
MEMBERS OF THE WILLIAMS CLUB
IN APPRECIATION OF MANY COURTESIES
SHOWN THEM WHILE HIS GUESTS AT
"The Hermitage"
SANDWICH MASS.
JUNE 12—13. 1909
"MAY YOU LIVE LONG AND PROSPER"

BACON
MAKES IT
BETTER!

BACON
MAKES IT
ETTER!

To Brother
Thomas Burton [illegible]
This cup is given by the
Members of the Williams Club
In appreciation of many courtesies
Shown them while his guests
"The Hermitage"
Sandwich Mass.
June 12–13. 1909
May You Live Long and Prosper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WILLIAM · F · PINKHAM
ALFRED C J POPE
AUGUST F SCHERER
CHARLES W TABER
EUGENE · C · UPTON
IRVING · E · WILLIAMS
ROBERT · G · WILSON
ARTHUR · H · WOODCOCK
WILLIAM · K · DAVIDSON

ASHMAN
BARLOW
HETHERING
ES·R·KINGSBURY
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MAN·F·KLEIN
PAUL·C·K
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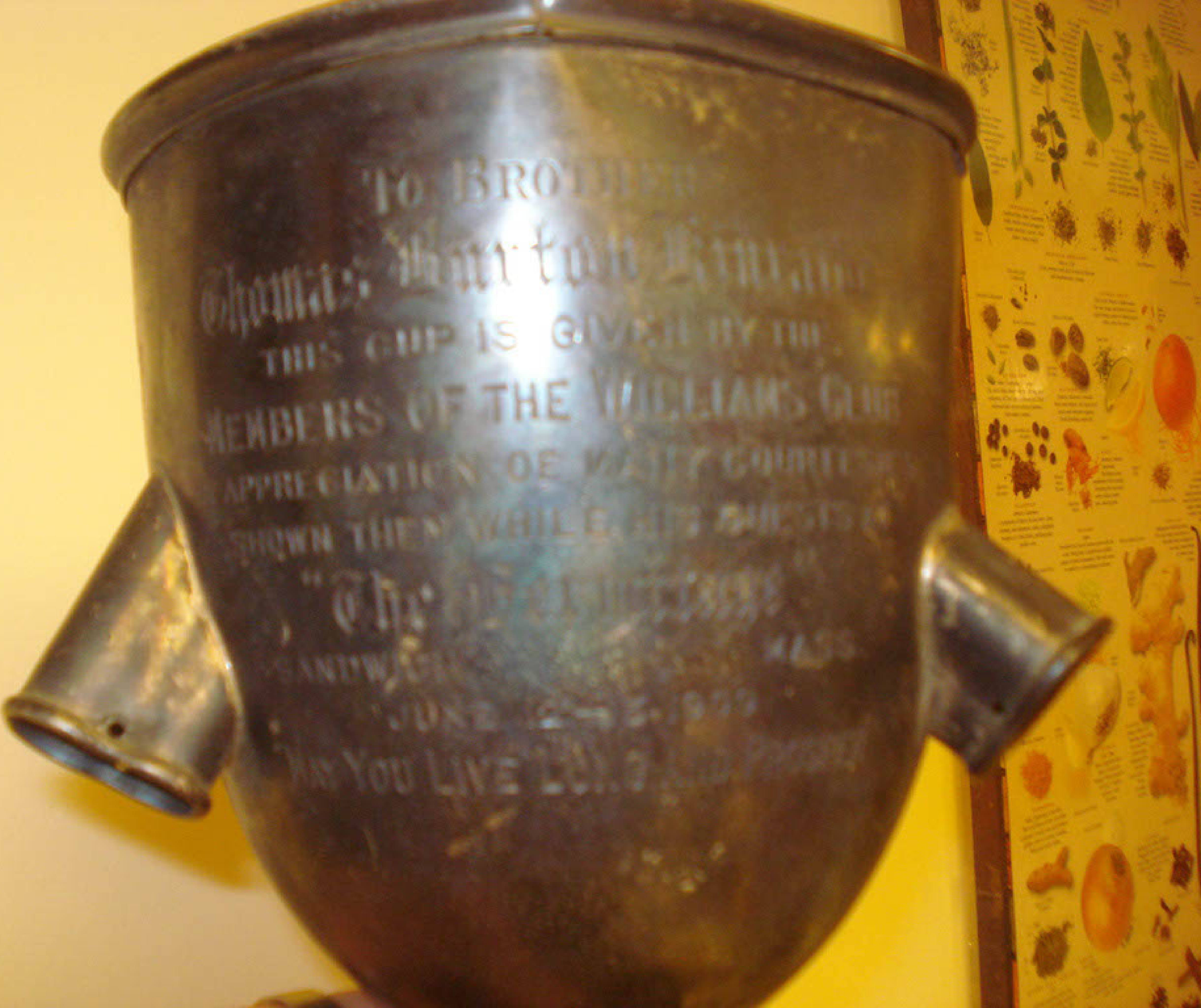
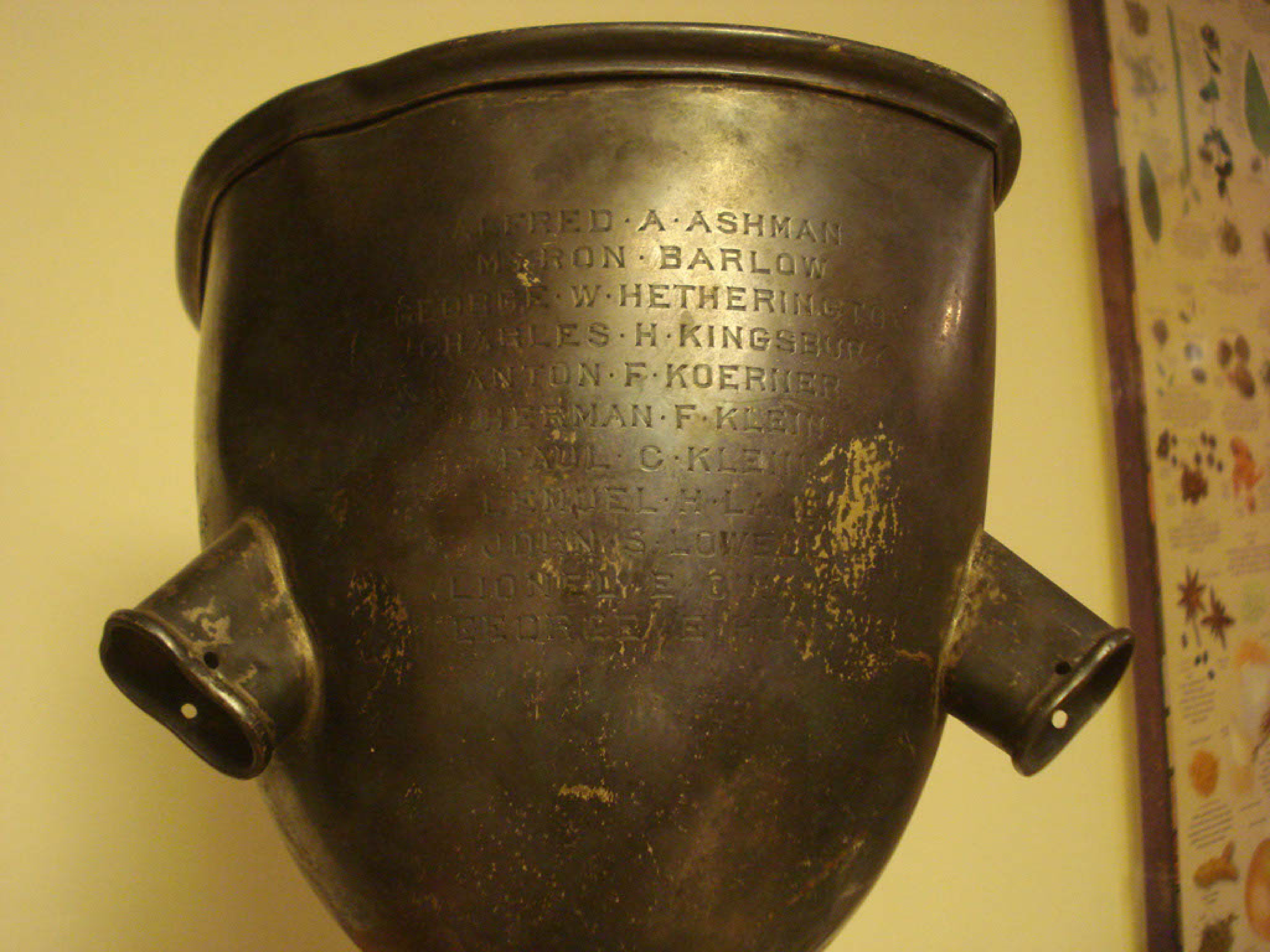
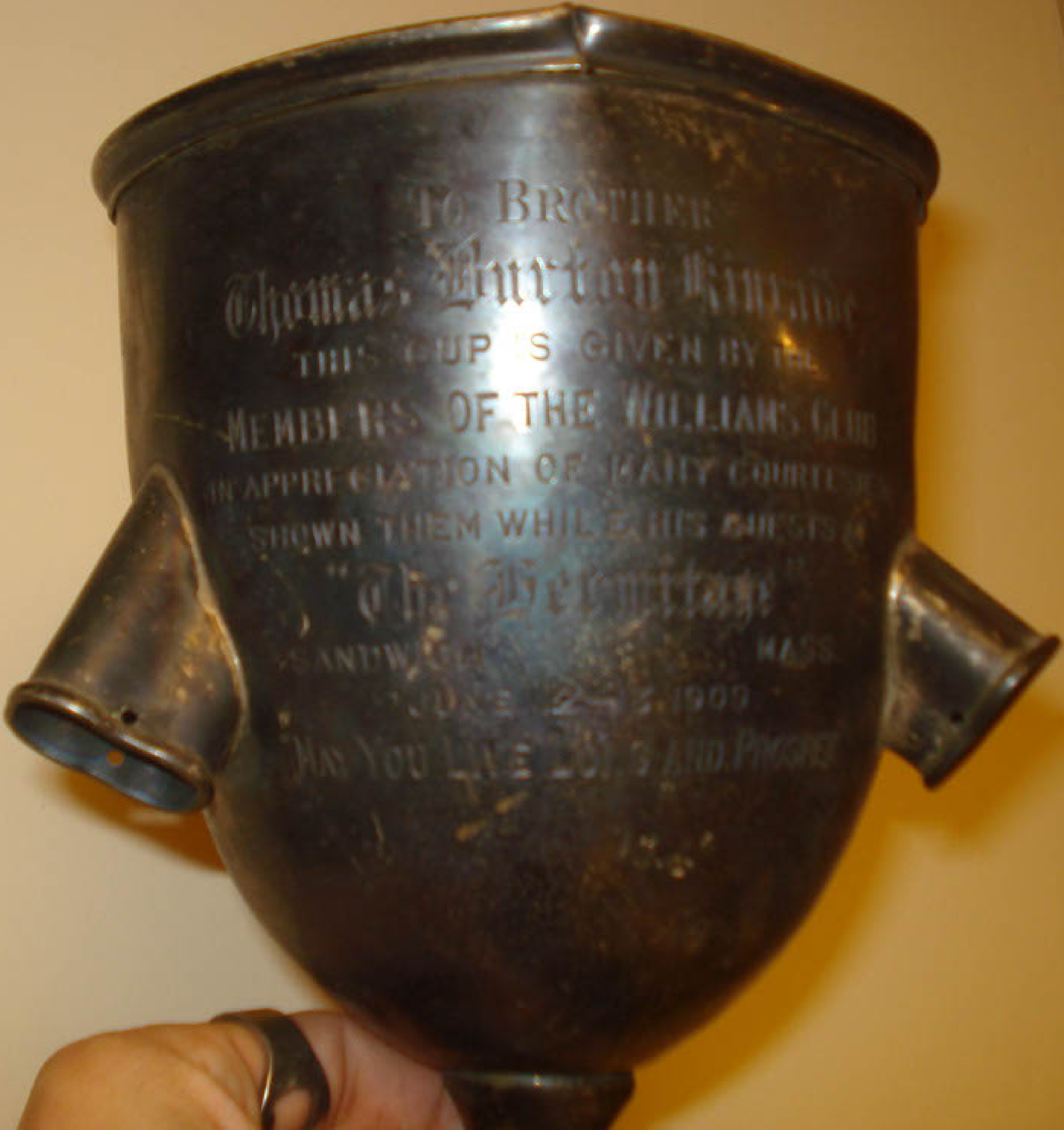
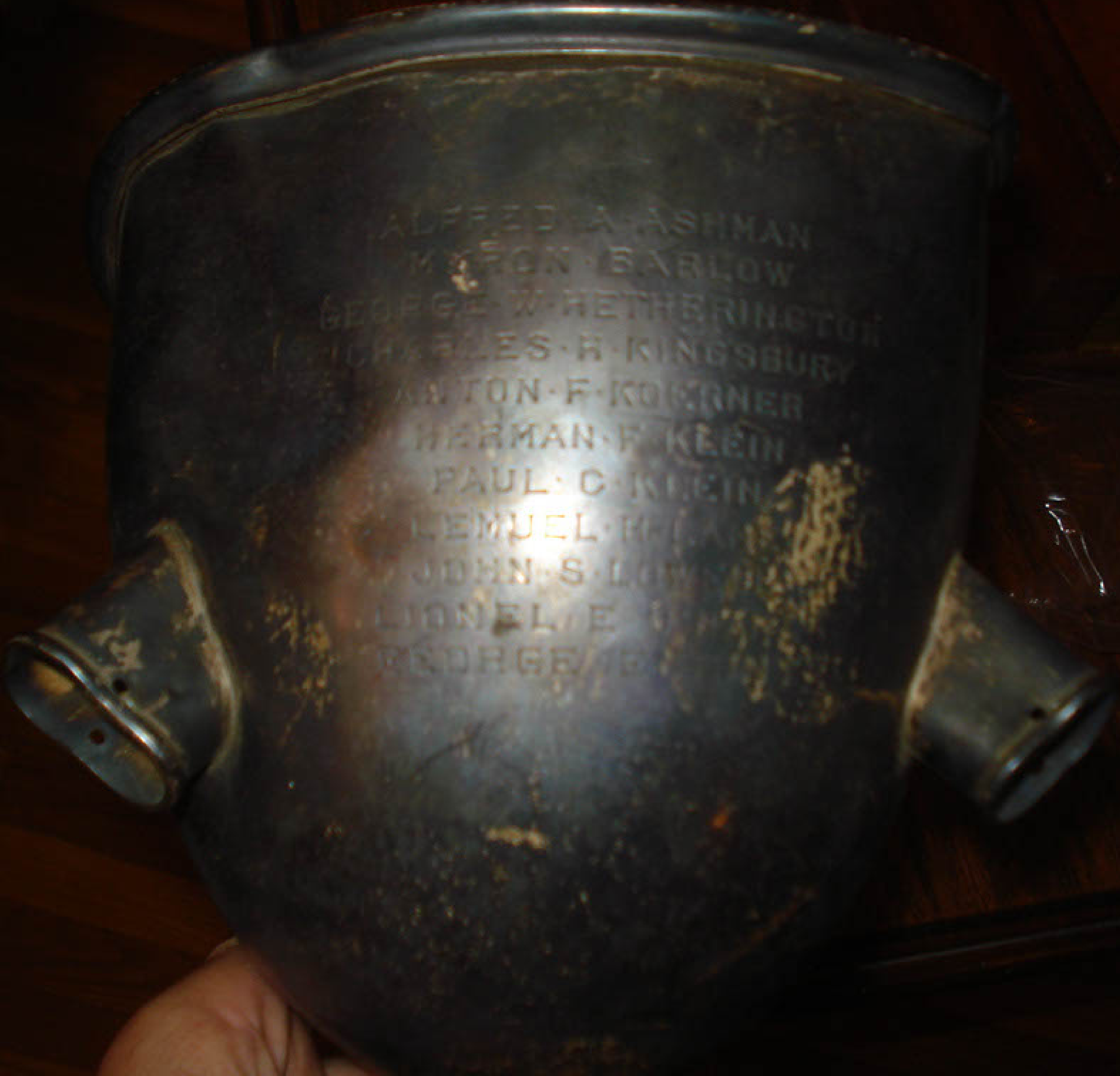
GE


TO BROTHER
Thomas Burton [illegible]
THIS CUP IS GIVEN BY THE
MEMBERS OF THE WILLIAMS CLUB
APPRECIATION OF MANY COURTESIES
SHOWN THEM WHILE HIS GUESTS AT
"The [illegible]"
SANDWICH [illegible] MASS
JUNE [illegible]
MAY YOU LIVE LONG [illegible]


ALFRED·A·ASHMAN
MYRON·BARLOW
GEORGE·W·HETHERINGTON
CHARLES·H·KINGSBURY
ANTON·F·KOERNER
HERMAN·F·KLEIN
PAUL·C·KLEIN
LEMUEL·H·LA
JOHN·S·LOWE
LIONEL·E·O
GEORGE·E·H


TO BROTHER
Thomas Burton Kinraide
THIS CUP IS GIVEN BY THE
MEMBERS OF THE WILLIAMS CLUB
IN APPRECIATION OF MANY COURTESIES
SHOWN THEM WHILE HIS GUESTS AT
"The Hermitage"
SANDWICH [illegible] MASS
JUNE 2–3, 1909
MAY YOU LIVE LONG AND PROSPER

TeamViewer 8
Skype
ZD55X10000...
CalTool
ScanPattern
zinFrame Panel
ZD55X1000214DFA
General
Advanced
Fine Tuning
About
Calibration
Diagnose
Servicing interface control established
Programs
Folders
Windows Compatibi...
Angry Birds Rio
Bing Maps 3D
EditPlus 3
Runespell Overture
Fruit Ninja
World of Goo
Torchlight
Arena
Snowflake
Emulator
Plants vs. Zombies
Monopoly
Bejeweled 3
IdentityMine Smudge
Files & Documents
Steam
WinSCP
Google Chrome
Acrobat Reader 3.0
putty
Intel AppUp...
Dropbox
IdentityMine Sand
Play More Great Games!


ALFRED·A·ASHMAN
MYRON·B·BARLOW
GEORGE·W·HETHERINGTON
CHARLES·R·KINGSBURY
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LIONEL·E
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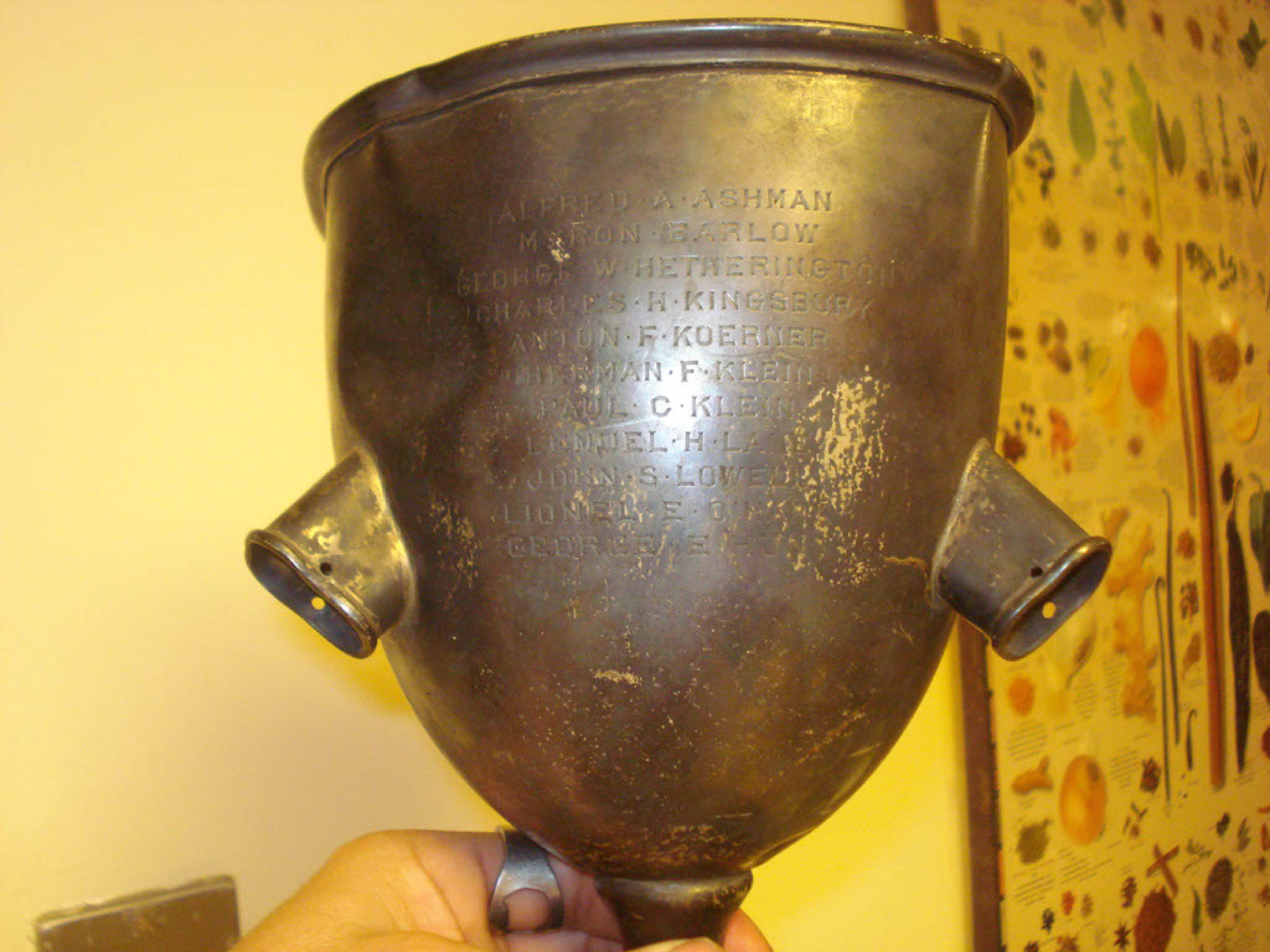
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MYRON · BARLOW
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HERMAN · F · KLEIN
PAUL · C · KLEIN
LEMUEL · H · LA
JOHN · S · LOWE
LIONEL · E · O
GEORGE · E

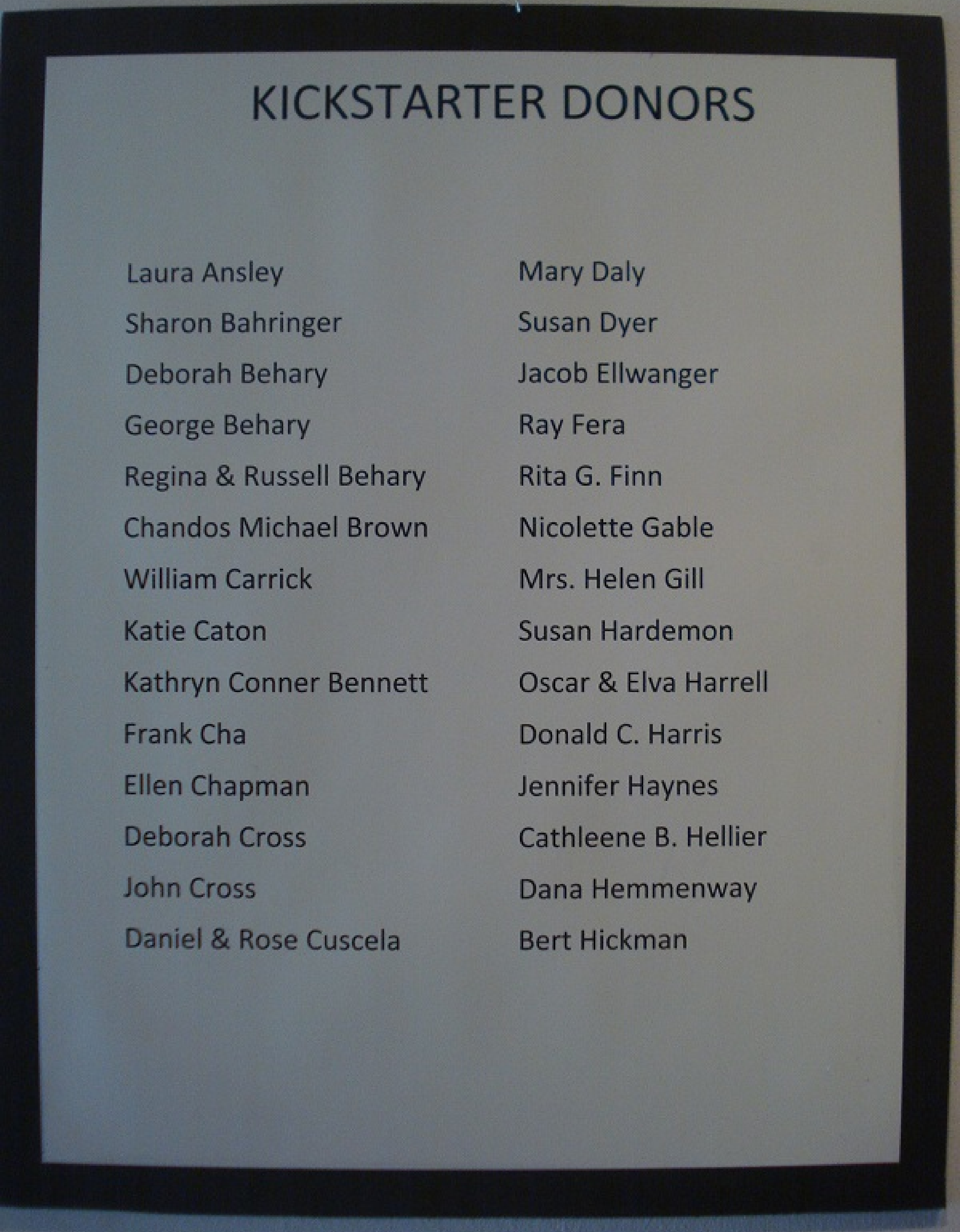
LINDA MATNEY GALLERY

LINDA MATNEY GALLERY

Cadbury
creme egg
18
4
IMPORTED

LMG
LINDA MATNEY GALLERY

X-RA•DI•ANCE
FOUR ARTISTS EXPLORE THE TECHNOLOGY OF X-RAYS
LMG
Diane Covert
Nick Veasey



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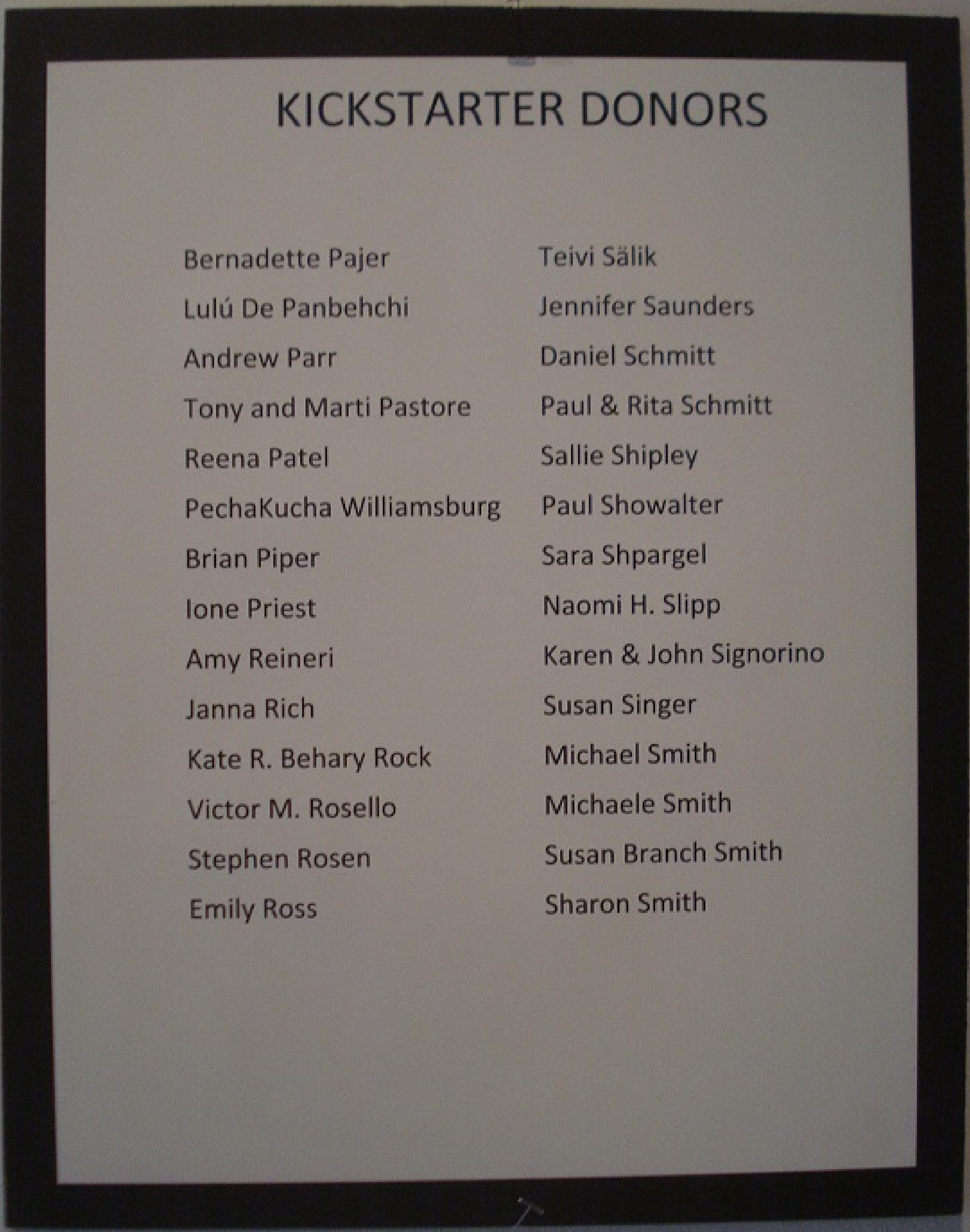

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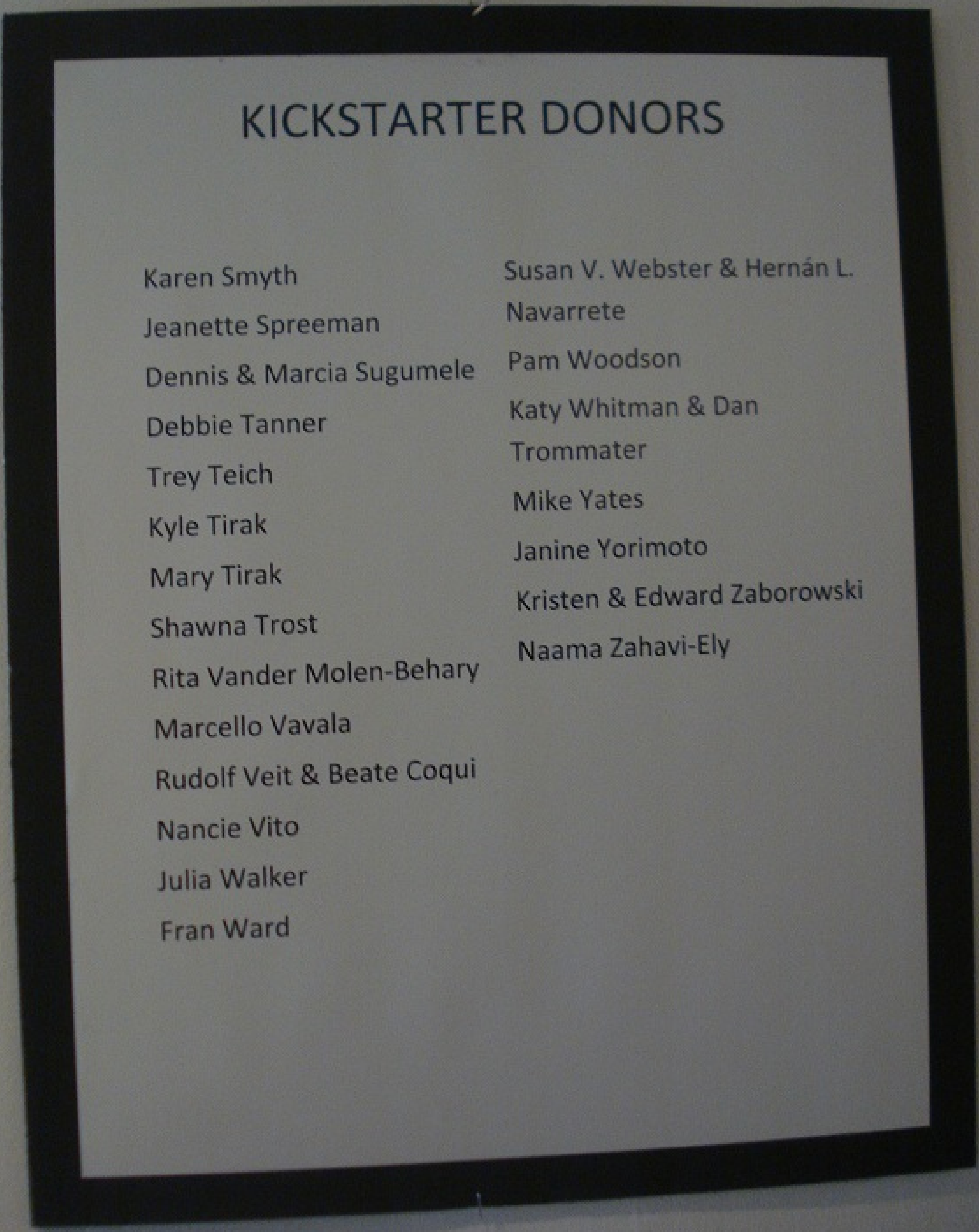

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Pam Woodson
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Mike Yates
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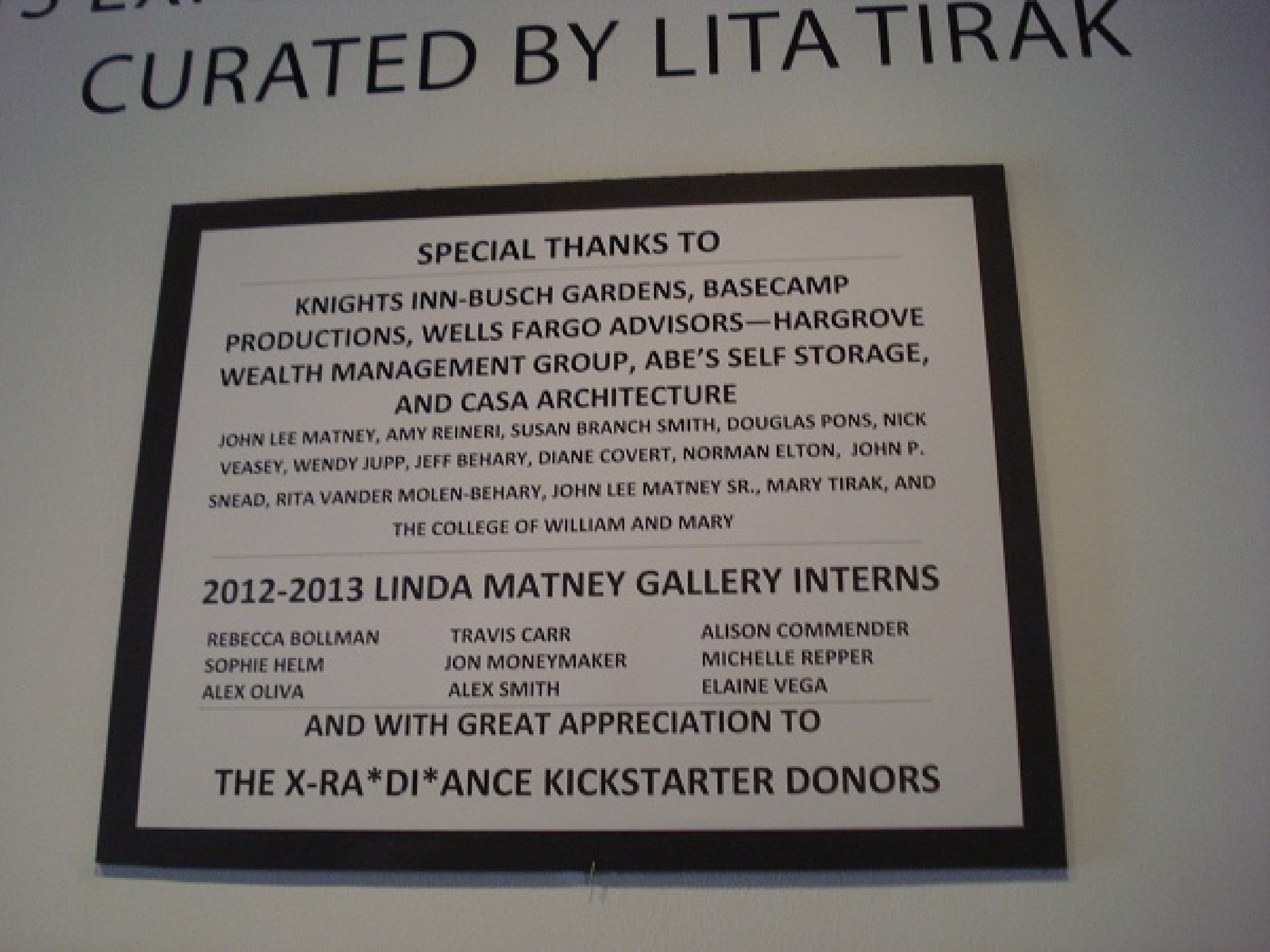

CURATED BY LITA TIRAK

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JOHN LEE MATNEY, AMY REINERI, SUSAN BRANCH SMITH, DOUGLAS PONS, NICK VEASEY, WENDY JUPP, JEFF BEHARY, DIANE COVERT, NORMAN ELTON, JOHN P. SNEAD, RITA VANDER MOLEN-BEHARY, JOHN LEE MATNEY SR., MARY TIRAK, AND THE COLLEGE OF WILLIAM AND MARY

2012-2013 LINDA MATNEY GALLERY INTERNS

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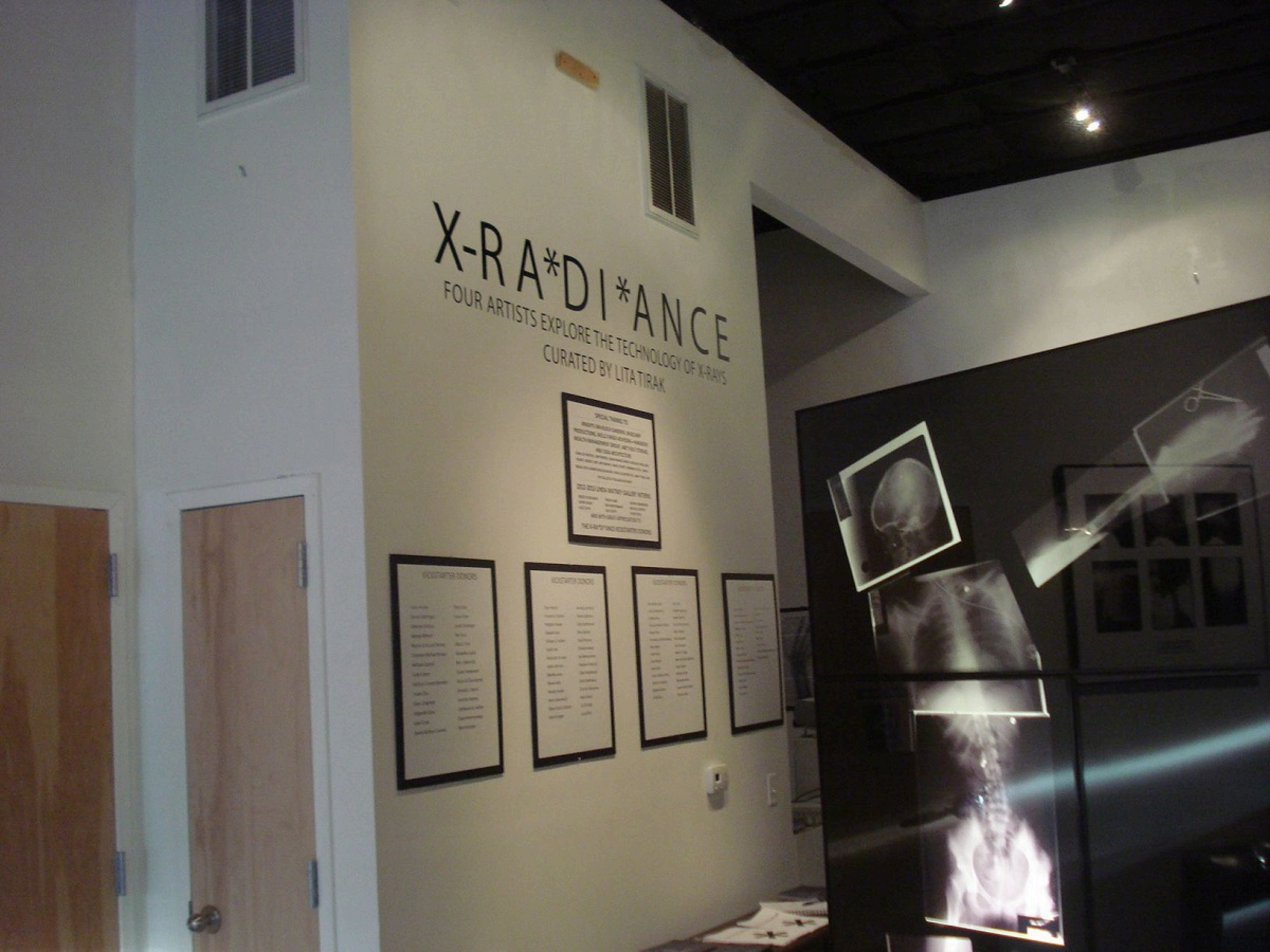
SOPHIE HELM
ALEX OLIVA
TRAVIS CARR
JON MONEYMAKER
ALEX SMITH
ALISON COMMENDER
MICHELLE REPPER
ELAINE VEGA

AND WITH GREAT APPRECIATION TO

THE X-RA*DI*ANCE KICKSTARTER DONORS

X-RA*DI *ANC
FOUR ARTISTS EXPLORE THE TECHNOLOGY OF X-RAYS
CURATED BY LITA TIRAK

CURATOR'S INTRODUCTION
X-RA*DI*ANCE.
Lila Tirak, Curator of X-RA*DI*ANCE
EXIT


X-RA*DI*ANCE
FOUR ARTISTS EXPLORE THE TECHNOLOGY OF X-RAYS
CURATED BY LITA TIRAK

LMG

LINDA MATNEY GALLERY

*PROF. JOHN
GRIZZY*
DANGER
ELECTRIC
CHAIR
15,000
Volts

High Voltage apparatuses found their way into many applications

One of the key performances and major draws of the Carnival "side show" in the early 20th century was the "Electric Chair". The "secret" behind this is high voltage Tesla circuits (the Tesla Coil).

DEFIES DEATH
ELECTRA
"THOMAS KINRAIDE"

LINDA MATNEY GALLERY

*PROF. JOHN
GRIZZY*
DANGER
ELECTRIC CHAIR
*THOMAS
KINRAIDE

LINDA MATNEY GALLERY

LMG
LINDA MATNEY GALLERY
DIANE COVERT

LMG
LINDA MATNEY GALLERY
DIANE COVERT

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LINDA MATNEY GALLERY
"PROF. JOHN
GRIZZY"

LINDA MATNEY GALLERY

"PROF. JOHN
GRIZZY"

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FEATURING THE WORKS OF
THOMAS B. KINRAIDE
JEFF BEHARY
DEMONSTRATIONS
BY
AND JEFF BE
"PROF. JOHN
GRIZZY"

LMG
LINDA MATNEY GALLERY
EXIT

PROFESSOR JOHN
AND JEFF BEHARY
KINRAIDE*
THE KINRAIDE COIL
HISTORICAL BACKGROUND INFORMATION
LMG
LINDA MATNEY GALLERY

*JEFF
BEHARY*

EVISITED
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FEATURING THE WORKS OF
THOMAS B. KINRAIDE
JEFF BEHARY
DIANE COVERT
NICK VEASEY
AND ELECTRICAL DEMONSTRATIONS
BY
PROFESSOR JOHN "GRIZZY"
AND JEFF BEHARY
*THOMAS
KINRAIDE*

VEASEY'

Bald
Burn
Hash
IPA
AIDA YAN
FANG
SCRABBLE
TRIPLE WORD SCORE
DOUBLE LETTER SCORE
DOUBLE WORD
BEST BY 31 JUL 2017
ginal
ed
chips

SCRABBLE
Every word's a WINNER.
CROSSWORD GAME
YARN
NIT
FAR
BIG
ZONE
EXPERTS
QUALM
TAPES
AORTAS
COW
SLIDER
HEDGED
RAILWA
DEFANG
Letter Distribution
A – 9
B – 2
C – 2
D – 4
E – 12
F – 2
G – 3
H – 2
I – 9
J – 1
K – 1
L – 4
M – 2
N – 6
O – 8
P – 2
Q – 1
R – 6
S – 4
T – 6
U – 4
V – 2
W – 2
X – 1
Y – 2
Z – 1
BLANK – 2
TRIPLE WORD SCORE
DOUBLE WORD SCORE
TRIPLE LETTER SCORE
DOUBLE LETTER SCORE

WILLIAMSBURG PUBLICATION

KNOB
CREEK
101
VIENNA LAGE
VIENNA STYLE LA
VIENNA LAG

Dogfish Head
Beer To Drink Music To

Rehoboth Beach, DE

As the Official Beer of Record Store Day, we had to create a special brew for the occasion! Now for the second year, that's just what we've done with Beer To Drink Music To. In volume two of this celebratory ale, this Tropical Blonde is brewed with hibiscus flowers and kiwi juice. It's perfect marriage of beer and best when paired with favorite tunes. Beer To ' is a pinkish-red notes of tropical and floral

Oozlefinch
Lady in White Hefeweizen
Ft. Monroe, VA

"She might come to you in a dreamlike fog, or you could catch a glimpse of her through an upstairs window at dusk. Repeated sightings of this mysterious "Lady In White" have made her a notorious presence on Fort Monroe. Accounts differ as to her origin—some say she's Jefferson Davis' wife, Varina, who stayed in nearby quarters throughout his imprisonment in the fort. Others claim she's a Civil War soldier's wife who was unfaithful while he was away and subsequently murdered by him upon his return. No one really knows. But this hazy, German-style Hef with flavors of wheat, banana, and clove is so good it's sure to give you chills, just like the mysterious apparition haunting Fort Monroe to this day."

Virginia Beer Co. Free Verse
IPA

Williamsburg, VA

Conform to the bitter expectations of your standard India Pale Ale? Not us. We pair the juicy, tropical flavors of Azacca hops with whole-cone spicy, piney Chinook to create a rounded bitterness. A hoppy, aroma-forward delight that will appeal to both IPA lovers and those who don't think they like IPAs…yet.

Williamsburg AleWerks
Brown Ale

Williamsburg, VA

An American Brown Ale with a nutty, chocolate aroma and big flavors of caramel, chocolate, and pecans. American hops balance out the finish.

Tradition Red Willie
Irish Red

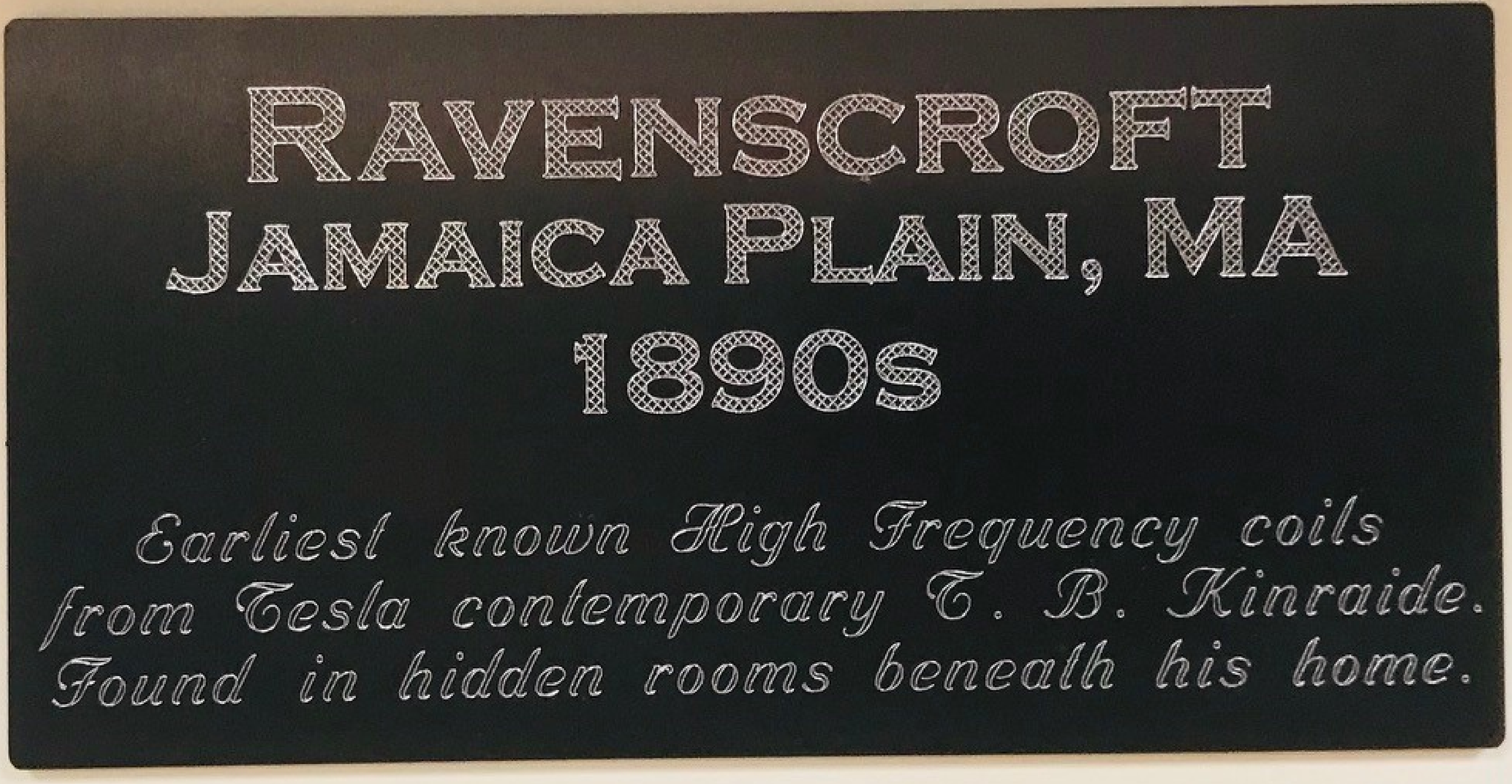
Newport News, VA

This dark copper colored Red is malt-sweet and clean up front lightly bittered with East Kent Goldings and Fuggles hops with drying finish. This

ELECTRO
MECHANICAL
MUSEUM
1700s - 1900s
JEFF BEHARY
CURATOR
ELECTRICAL ROOM

Cooper Hewitt
Chicago
1900s
Ravenscroft
Jamaica Plain, MA
1890s
Cenco Scientific
Chicago
1900s
Philip Atkinson
Chicago
1888
Prototype UV Bulbs
Unknown Origin
1900s
ES Ritchie & Sons
Dorcester, MA
11 April 1868
Kinraide Coil
Jamaica Plain, MA
1898

RAVENSCROFT
JAMAICA PLAIN, MA
1890s
CENCO SCIENTIFIC
CHICAGO
1900s
COOPER HEWITT
CHICAGO



RAVENSCROFT
JAMAICA PLAIN, MA
1890s

Earliest known High Frequency coils from Tesla contemporary T. B. Kinraide. Found in hidden rooms beneath his home.

SON
achine for
KINRAIDE COIL
JAMAICA PLAIN, MA
1898
Fully functioning replica of the first practical X-Ray machine in the U.S. Handmade by Jeff Behary.

CAMPBELL ELECTRIC
LYNN, MA
1916
Campbell

OLD Mr. BOSTON
surviving
Ray Tubes

WETT & LEWIS
BOSTON
1897
the earliest surviving
n-made X-
Mr.BOSTON
UNKNOWN ORIGINS
1900s
Rare prototype Quartz lamps of
unknown origin! All still function

PROTOTYPE UV BULBS
UNKNOWN ORIGINS
1900s
Rare prototype Quartz lamps of
known original. All still function.
Ultraviolet Lamps

Thomas Burton Kinraide
Jamaica Plain, MA
1897-1899
Glass Plate Negatives, 8" x 10"
Rare Photographs of Electricity.

BETZ
FRANK S. BETZ
HAMMOND, IN
1903

E. J. ROSE
SAN FRANCISCO
1935
VICTOR ELECTRIC
CHICAGO
1916
SEELEY LABORATORIES
PHILADELPHIA
1907
VIOLET
RAY

Early X-Ray Tubes
Westinghouse
Pittsburgh
1880s
Svet će još dugo morati da čeka na
um ravan Teslinom po stvaralačkoj
sposobnosti

WESTINGHOU
PITTSB

MASTER VIOLET RAY
VARIOUS COMPANIES
MADE IN USA
1900-1930s
WESTINGHOUSE
PITTSBURGH
1880s
Early electrical meters for the new
Tesla Alternating Currents

SUN-KRAFT, INC.
CHICAGO
1930
SPERTI SUNLAMP
MITCHELL, KY
1935
KEELY MOTOR COMPANY
KEELY MOTOR MYSTERY
1875-2010
Sperti
Tesla

MILLER-TROJAN
TROY, OH
1940
Carbon Arc lamp made by the famous welding company Miller.
RITTER DENTAL
ROCHESTER
1920
Dental X-Ray Machine, 1920s
Extreme shock hazards...
Construction of Induction Coils and Transformers
H. WINFIELD SECOR
PRICE 25 CENTS
Published by
Modern Publishing Company
New York
ELECTRICITY IN MEDICINE
STATIC ELECTRICITY AND THE USES OF THE ROENTGEN RAY
SNOW
VOLTMETER

No. 615,653
Patented Dec. 6, 1898.
T. B. KINRAIDE.
HIGH FREQUENCY INDUCTION APPARATUS.
(No Model.)
Fig. 1
Fig. 2
Fig. 3
Fig. 4
Fig. 5
Fig. 6
Witnesses:
A. C. Harmon
Walter E. Lombard
Inventor
Thomas B. Kinraide
by Crosby Gregory
attys.
Fig. 2
Fig. 4

SAGE HADLEY
200 TOWNSEND
MASON, NH 03048
JEFF BEHARY
627 36TH STREET
WEST PALM BEACH, FL
33407
QUEEN & CO.

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are used you may know
taking into the syst
medicine verfu
dige
which every ak ston
So widely own a
these tablets become
now sold by every
United States Can
ain.

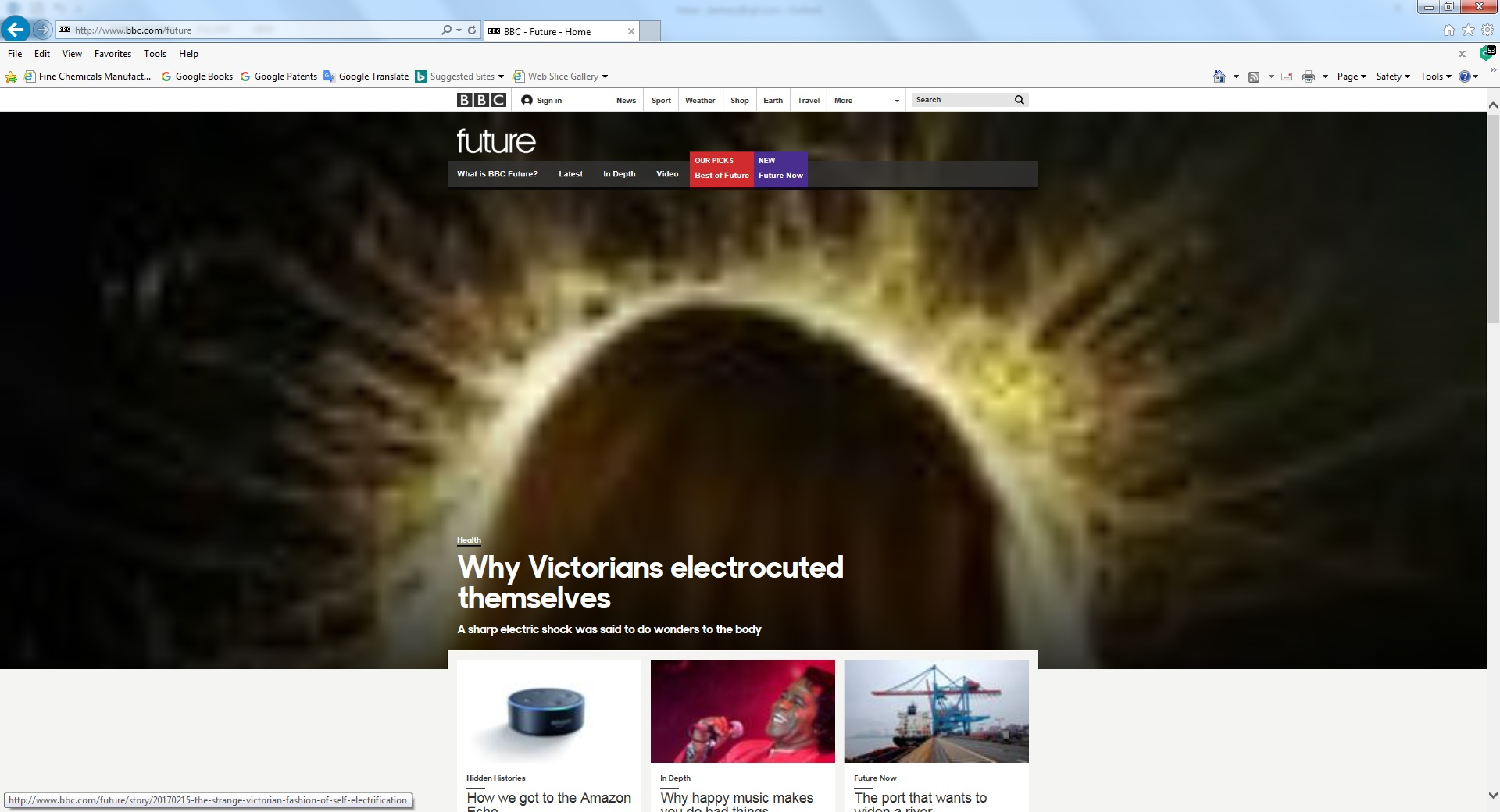
NEW YORK

Ex-Fire Chief Bonner to Reorganiz
Manila Fire Department

NEW YORK Dec

C AUTOGRAPHS
CA PLAIN, MA
97-1899
photographed using the
Kinraide's patented coils.
ual size sparks!
MPBELL ELECTRIC
LYNN, MA
1916

JOHN CUTHBERTSON
LONDON
1700s
Medical Static Machine made by a famous London instrument maker
FRANCIS HAUKSBEE
COLCHESTER, UK
1705
Replica machine that generates light using mercury, a vacuum, and static electricity. Please do not touch.
UNKNOWN HANDMADE
PHILADELPHIA
1700s
Early American Static Machine-Benjamin Franklin? Joseph Priestley?
HAMMERMILL
Paper for Life.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Help
Fine Chemicals Manufact...
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Google Translate
Suggested Sites
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Tools
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Sign in
News
Sport
Weather
Shop
Earth
Travel
More
Search
future
What is BBC Future?
Latest
In Depth
Video
OUR PICKS
Best of Future
NEW
Future Now

Health

Why Victorians electrocuted themselves

A sharp electric shock was said to do wonders to the body

Hidden Histories

How we got to the Amazon

In Depth

Why happy music makes

Future Now

The port that wants to

http://www.bbc.com/future/story/20170215-the-strange-victorian-fashion-of-self-electrification